

### 6.3.3 Number of Professional development/administrative training programmes organized by the institution for its teaching and non teaching staffs during the year 2022-2023

SL.NO	Name of the programme	Number of Participants	Event Date
1.	FDP on Block chain technology	103	3.7.23-7.7.23
2.	FDP on Recent trends in electric vehicles	97	25.7.22-29.7.22
3.	FDP on Role of Artificial intelligence in power sector	87	29.5.23-2.6.23
4.	FDP on Cloud computing	82	18.07.22-22.07.22
5.	FDP on Emotional Intelligence	25	5.1.23-7.1.23
6.	FDP on Maritime Engineering	60	26.06.23-02.07.23
7.	Webinar on AI for Safety against Violent Attacks	50	15.10.22
8.	Seminar on Latest Technology need for IT Industry	30	17.10.22
9.	Recent Development in Enterprise AI and Chip Design (CSI Students Chapter)	78	26.04.23
10.	Seminar on Challenging Network Security Issues	90	12.06.23
11.	Seminar on ChatGPT with AI	75	10.08.23
12.	Role of AI in Modern Technology	33	11.08.23
13.	Faculty Development Programme on "Computational Fluid Dynamics"	50	26.08.22



**PRINCIPAL**  
PSN COLLEGE OF ENGINEERING & TECHNOLOGY  
MELATHEDIYOOR, PALAYAMKOTTAI TALUK  
TIRUNELVELI DIST. - 627 152.

# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)



Melathediyoor, Tirunelveli – 627 152

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Web site: [www.psnct.ac.in](http://www.psnct.ac.in) Email.ID: [principal@psnct.ac.in](mailto:principal@psnct.ac.in)

Phone. No: 04634-279009

## Department of Computer Science and Engineering

### Report of the Event

Title of the Event	Faculty Development Program on Cloud Computing
Date & Time	18.07.2022 to 22.07.2022
Name(s) of the Resource Persons	Mr.Saravana Kumar Chief Executive Officer, Iconix Software solutions, Tirunelveli. Dr.K.Jeyakumar, Associate Professor, School of Computer and Engineering, VIT, Vellore. Dr.Beulah David.D, Professor, Saveetha School of Engineering, Chennai Mr.Saravana Kumar Chief Executive Officer, Iconix Software solutions, Tirunelveli Dr.R.Palanikumar, Professor, PSR Engineering College.
Name of the Event Coordinator	Mrs.J.Yamuna Bee, Assistant Professor, PSN College of Engineering and Technology
No. of Participants	82

### Event Outcomes

Upon the completion of this course, the Faculty members will be able to

- Design a System, Component or Process as per needs and Specifications.

### Remarks of the Coordinator about the Event

A Five days FDP was organized by the Department of Computer Science and Engineering from 18-07-2022 to 22-07-2022. Mrs.J.Yamuna Bee, Assistant Professor/CSE was the event coordinator and Mr.Saravana Kumar Chief Executive Officer, Iconix Software solutions, Tirunelveli, Dr.K.Jeyakumar, Associate Professor, School of Computer and Engineering, VIT, Vellore, Dr.Beulah David.D, Professor, Saveetha School of Engineering, Chennai, Dr.R.Palanikumar, Professor, PSR Engineering College, are the resource persons of this Five day FDP. However 82 faculty members were participated, benefitted and received their participant Certificates. The objective of the workshop was to provide the basic knowledge of Design a System, Component or Process as per needs and Specifications. Faculty members were impressed about the way the speaker delivered.

  
Event Coordinator

Date: 23.07.2022



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Phone. No: 04634-279009

## Department of Computer Science and Engineering

Date: 14.09.2022

### ARTIFICIAL INTELLIGENCE CLUB

#### REPORT OF THE HANDS ON TRAINING PROGRAM ON ARTIFICIAL INTELLIGENCE

- The Department of Computer Science and Engineering organized a "Hands on Training Program on Artificial Intelligence" at our Smart Class room on 13.09.2022.
- Er. SaravanaKumar, Project Executive, Iconix Software Solutions, Tirunelveli., gave a presentation about the Speech Recognition and Python for AI.
- In this event totally 50 students Participated.

  
COORDINATOR

  
HOD

  
PRINCIPAL

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Phone. No: 04634-279009

**Department of Computer Science and Engineering**

Date: 20.10.2022

**ARTIFICIAL INTELLIGENCE CLUB**

**REPORT OF THE WEBINAR ON AI FOR SAFETY AGAINST VIOLENT  
ATTACKS**

- The Artificial Intelligence Club and the Department of Computer Science and Engineering jointly organized a “Webinar on AI for Safety against Violent Attacks” will gave a lecture through Zoom app on 15.10.2022.
- Dr.Princy Randhawa, Assistant Professor, Department of Mechatronics, Manipal University, Jaipur, gave a presentation about the Wearable Technology for AI.
- In this event totally 50 students Participated.

  
COORDINATOR



  
PRINCIPAL



# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)



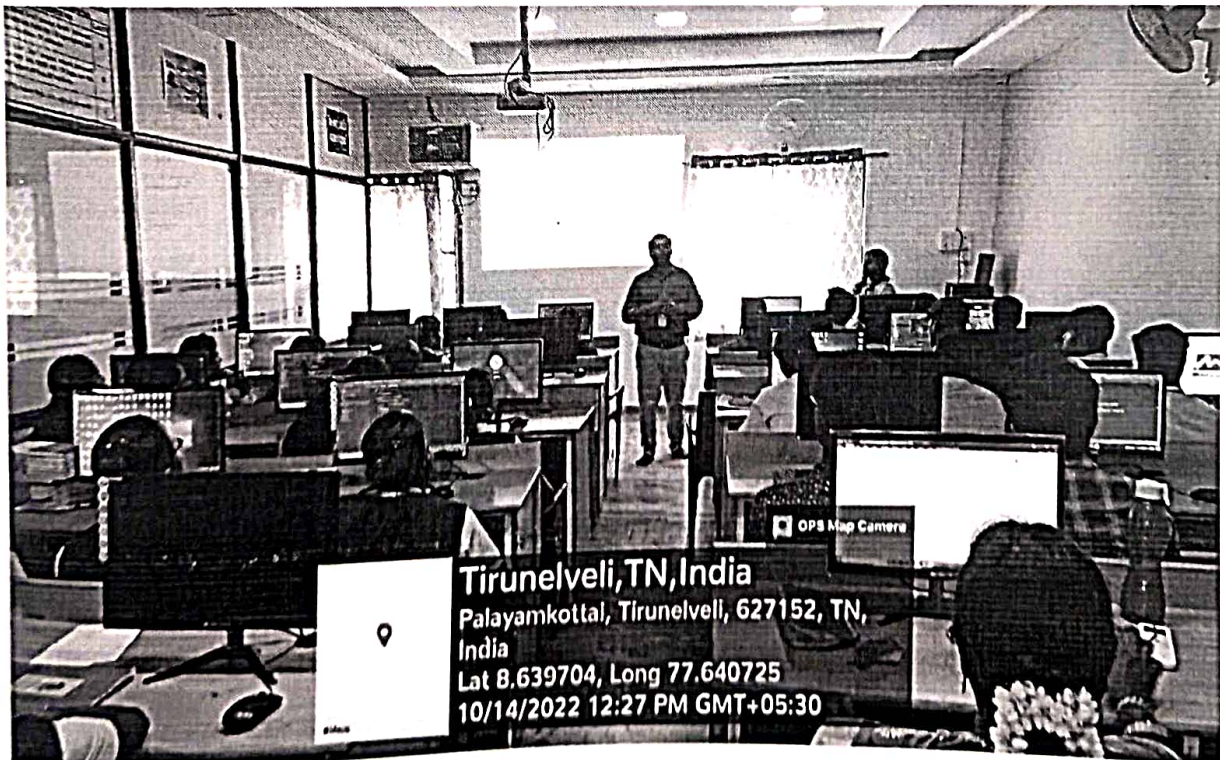
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Phone. No: 04634-279009

## Students' ChapterEvent

Computer Society of India (CSI) students' chapter was organized a seminar about latest Technology need for IT industry on 14.10.2022 at Alan Turing Computer center. The program was started after the inaugural function of CSI students Chapter. Er.R.Saravanakumar, CEO, Iconix Software Solution highlighted the latest software to be learned to explore in today's IT Industry. Those who were participated the seminar gained knowledge on latest software.



Tirunelveli, TN, India  
Palayamkottal, Tirunelveli, 627152, TN,  
India  
Lat 8.639704, Long 77.640725  
10/14/2022 12:27 PM GMT+05:30

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Phone. No: 04634-279009

## Department of Computer Science and Engineering

### Report of the Event

Title of the Event	<b>Faculty Development Program on Emotional Intelligence</b>
Date & Time	05.01.2023 to 07.01.2023 (3 days)
Name(s) of the Resource Persons	Mr. Nirmal Kumar, Chief Trainer, ICT Academy, Chennai
Name of the Event Coordinator	Mrs. J. Yamuna Bee, Assistant Professor, PSN College of Engineering and Technology
No. of Participants	25
<b>Event Outcomes</b>	
Upon the completion of this course, the Faculty members showed <ul style="list-style-type: none"><li>an increased ability to manage stress and depression, and better attitudes about themselves</li></ul>	
<b>Remarks of the Coordinator about the Event</b>	
A three days FDP was organized by the Department of Computer Science and Engineering in association with ICT Academy from 05.01.2023 to 07.01.2023. However 25 faculty members from our college and other colleges were participated, benefitted and received their participant Certificates. The objective of the workshop was to develop the self-awareness, self-control, and interpersonal skills that are vital for College, work, and life success. Faculty members were impressed about the way the speaker delivered.	

Date: 10.01.2023

  
Event Coordinator



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## Students' Chapter Event Report

DATE: 27.04.2023

Computer Society of India (CSI) students' chapter was organized a seminar about **Recent Development in Enterprise AI and Chip design** on Wednesday (26.4.2023) 10.30 am to 11.30 am at MBA Seminar Hall. The program was started after the Welcome address given by Ms.SrigayathriPriya K.

Mr.Ganesan Narayanasamy, Global leader for Education and Research, IBM Infrastructure was shared the details about **Enterprise AI and Chip design**. Those who were participated in this seminar gained knowledge on **Enterprise AI and Chip design**. The session was more interactive and students were raised questions towards the resource person and cleared their doubts on Enterprise AI and Chip design.

### **Outcome of this Event:**

From this seminar students were able to understand

- AI's Key Benefits and Risks;
- Current and Potential AI Use Cases;
- Building a Successful AI Strategy;
- Necessary Steps For Implementing AI Tools in The Enterprise;
- Technological Breakthroughs that are driving the Field Forward.

CSI-Coordinator

HOD-CSE



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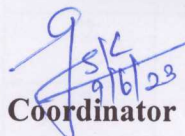
## Department of Computer Science and Engineering

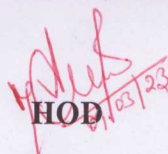
09-06-2023

Submitted to Principal,

This is to inform you that our Computer Science and Engineering department has planned to conduct **Technical Seminar** on the topic of “**Challenging Network Security issues**” on 12-06-2023 for IV Year Students.

In this regard. Kindly give permission to conduct the same.

  
Coordinator

  
HOD

  
Principal

### Vision [Institute]

*Emerge as a pioneer institute inculcating engineering education and skills, research, values and ethics.*

### Vision [Department]

*To emerge as a preeminence program to produce quality Computer Science and Engineering graduates*



### PARTICIPANTS ATTENDANCE

S.NO	Register Number	Students Name	Signature
1	2003001	ABIRAMI K	K. Abirami.
2	2003002	ABISHEK H	H. Abishek
3	2003003	AJJAPPAN G	Ajappan
4	2003005	ARAVINTH K	K. Aravindh
5	2003006	ARUNBALA M	M. Arun
6	2003007	BHARATHKUMAR M	B. Bhaskar
7	2003008	BOOPATHI RAJA A	A. Boopathi Raja
8	2003009	CHITRADEVI B	B. Chitra
9	2003010	DEVA B	B. Deva
10	2003011	DOSS ANTONY SANTHOSH A	A. Santosh
11	2003012	DURGESWARAN G	G. Durgeswaran.
12	2003013	ESAI ARASAN M	M. Arasan
13	2003014	ESTHER V	V. Esther
14	2003015	GIRIDHARAN MOHAN P	P. Mohan
15	2003016	GOWSALYA S	S. Gowsalya
16	2003017	HIRUSHIKESHAN K	K. Hirushikeshan.
17	2003018	INFANT OSWIN P	P. Oswin
18	2003019	JAYAGANESH J	J. Jayaganesh
19	2003020	JEEVA K	K. Jeeva

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20	2003021	JEEVAPRIYASHARNI M	M. J. S. S. S.
21	2003022	JOSEPH SAIMAN L	Saiman L.
22	2003023	KALAISELVI M	Kalai Selvi
23	2003024	KAMALA P	Kamala P.
24	2003025	KANAGALAKSHMI A	Kanagalakshmi A.
25	2003026	KARTHIKAISELVAN K	Karthikaivelvan K.
26	2003027	KARTHIKEYAN K	K. K. K.
27	2003028	KAVIYA M	M. Kaviya.
28	2003029	KOMURAJ M	K. Komuraj.
29	2003030	KUMARESAN S	S. Kumaresan.
30	2003031	MADHANRAJ V	V. Madhanraj
31	2003032	MAHADEVI R	R. Mahadevi
32	2003033	MAHESHWARI M	M. Maheshwari
33	2003035	MANISHA V	V. Manisha
34	2003036	MARI MAGESH R	R. Mari Magesh
35	2003038	MARISELVAM K	K. Mariselvam
36	2003040	MATHANKUMAR M	M. Mathankumar
37	2003041	MATHI M	M. Mathi
38	2003042	MUTHU GOWSALYA C	C. Muthu Gowsalya
39	2003043	MUTHUSELVI G	G. Muthuselvi
40	2003044	NALLAIYA B	B. Nallaiya
41	2003045	PERARI KRISHNAN K	K. Perari Krishnan
42	2003048	POONKANI K	K. Poonkani
43	2003049	S.PRABHUMUKILAN	S. Prabhukumilan

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Vision [Department]

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✓



44	2003050	PRATHESHA M	<i>Prathesha</i>
45	2003051	PRIYADHARSHINI B	<i>B. Priyadharshini</i>
46	2003052	PRIYADHARSHINI P	<i>P. Priyadharshini</i>
47	2003053	RAJESH J	<i>J. Rajesh</i>
48	2003054	ROBIN R	<i>R. Robin</i>
49	2003055	ROSARIYOINBARAJ I	<i>I. Rosariyo Inbaraj</i>
50	2003056	SAIKUMAR S	<i>S. Srikumar</i>
51	2003057	SAKTHI RAM M	<i>M. Sakthi Ram</i>
52	2003058	SANKAR GANESH S	<i>S. Sankar Ganesh</i>
53	2003059	SANTHOSH M	<i>M. Santhosh</i>
54	2003060	SATHISKUMAR M	<i>M. Sathiskumar</i>
55	2003061	SHANMUGAPRIYA K	<i>K. Shanmugapriya</i>
56	2003062	SHIVANI MAHALAKSHMI C	<i>C. Shivani Mahalakshmi</i>
57	2003063	SIVA SANKARAN S	<i>S. Siva Sankaran</i>
58	2003064	SIVAPRIYA M	<i>M. Sivapriya</i>
59	2003065	SRIGAYATHRI PRIYA K	<i>K. Sri Gayathri Priya</i>
60	2003066	SRINIVASAN T	<i>T. Srinivasan</i>
61	2003067	SRISUGIN M	<i>M. Srisugin</i>
62	2003068	SUBASHINI M	<i>M. Subashini</i>
63	2003069	SUJIN RAHUL R	<i>R. Sujin Rahul</i>
64	2003070	SUNDHARSIVA B	<i>B. Sundhar Siva</i>
65	2003071	SUNILKUMAR S	<i>S. Sunilkumar</i>
66	2003072	SURESH T	<i>T. Suresh</i>
67	2003073	SURYA PRAKASH A	<i>A. Surya Prakash</i>

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68	2003074	SWETHA S	<u>Swetha S</u>
69	2003075	TAMILARASU G	<u>G.Tail</u>
70	2003076	THIRUPATHYBALAJI D	<u>D.Thirupathy</u>
71	2003078	VARSHA C	<u>C.Varsha</u>
72	2003079	VENKATESAN S	<u>S.Venkatesan</u>
73	2003080	VENNILA A	<u>A. Vennila</u>
74	2003081	VINAYAGAMOORTHY G	<u>G. Vinayagamoorthy</u>
75	2003301	ANUVAISHNAVI.B	<u>B. Anusha Navaz</u>
76	2003302	ASHOK Y	<u>Ashok Y</u>
77	2003303	CHITRA.R	<u>Chitra R</u>
78	2003304	DINESH S	<u>Dinesh S</u>
79	2003305	ELANGO M	<u>Elango M</u>
80	2003306	GANESHAN M	<u>Ganeshan M</u>
81	2003307	KAJA MOHAIDEEN SITHICK S	<u>Kaja Mohaideen Sithick S</u>
82	2003308	KRISHNAKUMARI C	<u>Krishnakumari C</u>
83	2003309	LIVIN BOSE S	<u>Livin Bose S</u>
84	2003310	MERISON S	<u>Merison S</u>
85	2003312	SAMRAJ P	<u>Samraj P</u>
86	2003314	SANGEETHA D	<u>Sangeetha D</u>
87	2003315	SELVARAJ P	<u>P. Selvaraj</u>
88	2003316	SURYA R	<u>R. Surya</u>
89	2003317	VIJAYSON I	<u>I. Vijayson</u>
90	2003318	WELSON P	<u>P. Welson</u>

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Vision [Department]

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*[Signature]*

## Resource Person One Page Profile

**Name of the Resource Person:** Ms. J.Caroline Misbha

**Designation** : Assistant Professor

**Institution/Company** : Arunachala College of Engineering for Women, Nagercoil.

**Area of Expertise** : Deep Learning , Image Processing , Artificial Intelligence

**Working Experience (Industry/  
Academic Institution)** : 6 Yrs

### **Publication Details of Academician/Industry Resource Person:**

**Published 3 papers in International Journals**

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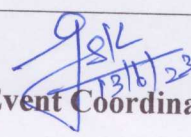
Phone. No: 04634-279009

## Department of Computer Science and Engineering

### Report of the Event

Title of the Event	<b>Technical Seminar on "Challenging Network Security Issues"</b>
Date & Time	12.06.2023 & 10.00 to 1.00 AM
Name(s) of the Resource Persons	J.Caroline Misbha , Assistant Professor, Arunachala College of Engineering for Women , Nagercoil.
Area of Specialization	Deep Learning , Image Processing , Artificial Intelligence
Name of the Event Coordinator	Mr. G. Sivakumar, Assistant Professor, PSN College of Engineering and Technology
No. of Participants	90
<b>Event Outcomes</b>	
Upon the completion of this course, Students will able to	
➤ Know about the Recent Technical Challenges in Networks	
<b>Remarks of the Coordinator about the Event</b>	
A One Day Technical Seminar was organized by the Department of Computer Science and Engineering on 12.06.2023. Mr. G. Sivakumar, Assistant Professor/CSE was the event coordinator.	
However 90 students were participated and benefitted. The objective of the seminar was to elaborate the Network challenges on recent days and types of Attacks. Students were impressed about the way the speaker delivered.	

Date: 13.6.2023

  
Event Coordinator



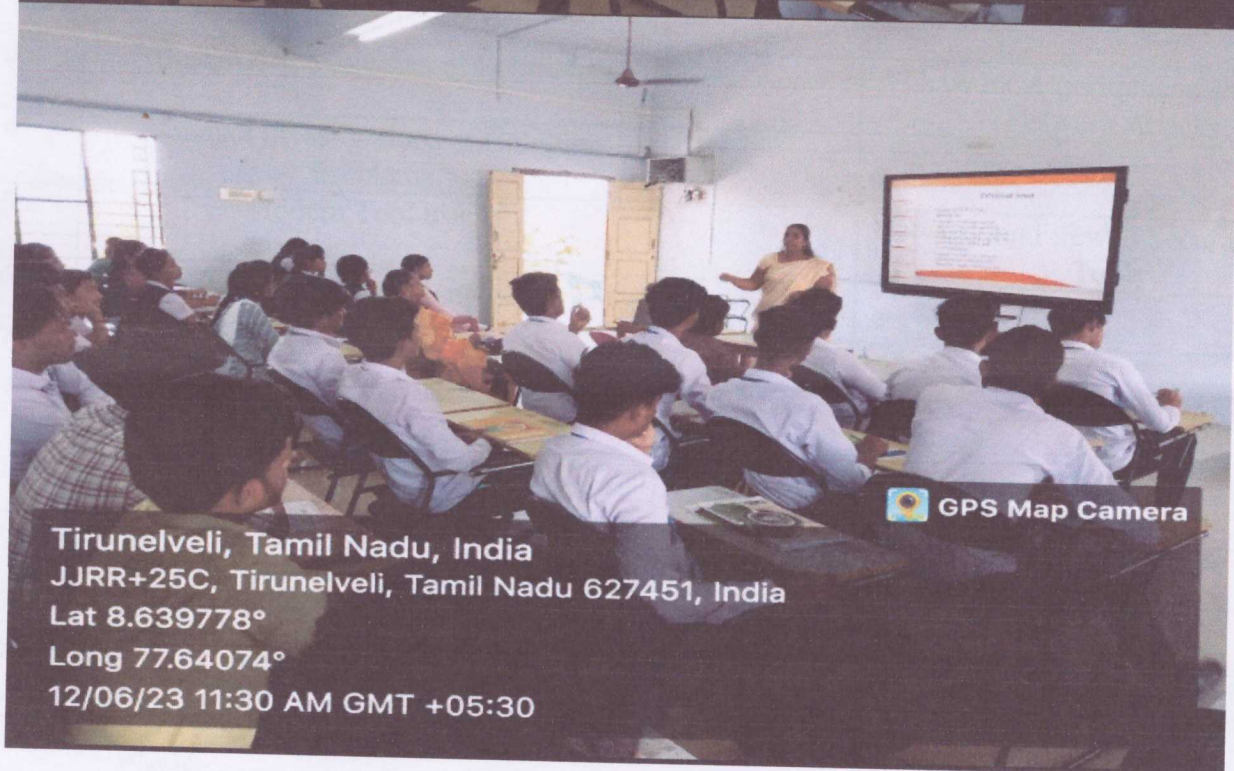
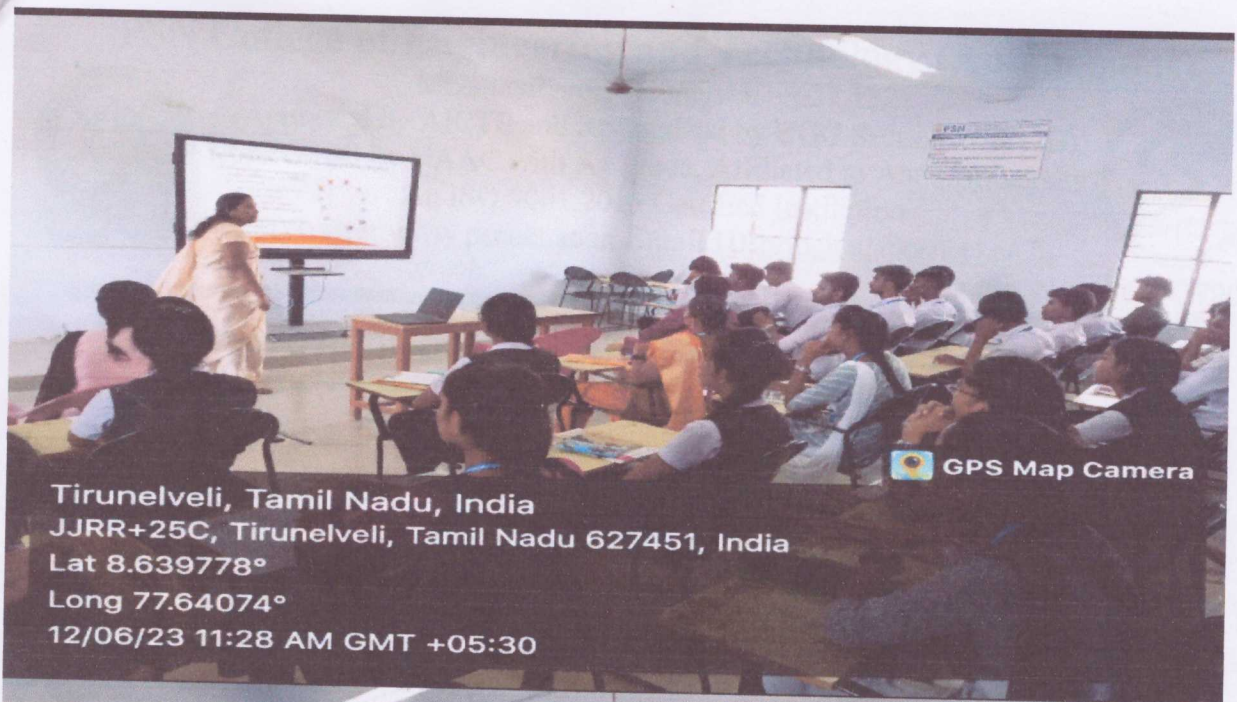
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### Vision [Department]

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**Figure:** Technical Seminar on “Challenging Network Security Issues”

*Handwritten signature in green ink.*

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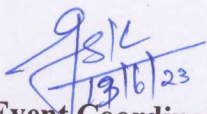


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## Department of Computer Science and Engineering

### Technical Seminar Program Outcomes (POs)

PO's No	KNOWLEDGE	Mapping	Topics
1	Engineering Knowledge	3	Introduction About Network Security
2	Problem Analysis	2	Network Attacks
3	Design /Development of Solutions	2	Network Algorithms to solve the Network Attacks
4	Conduct Investigations of Complex Problems		
5	Modern Tool usage	3	Networking Firewall Security & IDS Tools
6	The Engineer and Society		
7	Environment and Sustainability		
8	Ethics		
9	Individual and Team Work		
10	Communication		
11	Project Management and Finance		
12	Life-long Learning	2	About Network Security

  
Event Coordinator

  
HOD

  
Principal

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## Department of Computer Science and Engineering

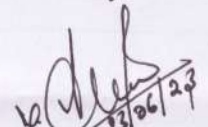
Date : 23.06.2023

Submitted to Principal,

This is to inform you that our Computer Science and Engineering department and CSI Students Chapter has planned to conduct Five days Faculty Development Program on “Block Chain Technology” from 03.07.2023 to 07.07.2023 through Online mode (Zoom Platform). Resource persons are from various reputed Institutions and Industries. In this regard we need Rs. 7500/- (Rupees Seven thousand five hundred only) for their remuneration.

Kindly give permission to conduct the Faculty Development Programme successfully.

  
Coordinator

  
HOD / CSE

Y<sup>a</sup>  
26/6/23

  
26/6/23

  
CHAIRMAN

repl. Jm

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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

FIVE DAYS ONLINE FDP – JULY (03-07) / 2023

### BLOCKCHAIN TECHNOLOGY

#### AGENDA

Date: 03.07.2023

10.10 AM – PRAYER SONG

10.15 AM – WELCOME ADDRESS By Dr.M.Vargheese, HoD/CSE/PSNCET

10.20 AM – CHIEF GUEST INTRODUCTION By Mrs.J.Yamuna Bee, AP/CSE/PSNCET

10.25 AM – PRINCIPAL'S ADDRESS By Dr.V.Manikandan, Principal / PSNCET


#### SCHEDULE

S.No	Date & Time	Resource Person	Topic
1	03.07.2023 (10.30 AM to 12.30 PM)	Dr.G.Gifta Jerith AI & ML School of Engineering, Malla Reddy University, Hyderabad	Basics of BlockChain Technology
2	04.07.2023 (10.30 AM to 12.30 PM)	Dr.M.Gayathiri Santhosh Department of Cryptology and Computing Sets, Chennai	BlockChain Security
3	05.07.2023 (10.30 AM to 12.30 PM)	Dr.Kiran Babu , MVJ College of Engineering, Bangalore	BlockChain for Advertising
4	06.07.2023 (10.30 AM to 12.30 PM))	Dr.S.Balakrishnan Sri Krishna College of Engineering & Technology, Coimbatore	BlockChain Technology for Food Industry
5	07.07.2023 (10.30 AM to 12.30 PM)	Dr.Jesu Vedha Nayahi Anna University Regional Campus, Tirunelveli	BlockChain Technology for HealthCare

07.07.2023 – Vote of Thanks By Mrs.H.Jeyalakshmi AP/CSE

  
Co-ordinator

  
Head of the Department

  
Principal



# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Melathediyoar, Tirunelveli – 627 152

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## Department of Computer Science and Engineering

Date: 15.06.2023

### Circular

#### **Sub: Faculty Development Program on Block Chain Technology– Reg.**

This is to inform you that our Computer Science and Engineering department has planned to conduct Five Days Online Faculty Development Program on “**BlockChain Technology**” on 03-07-2023 to 07-07-2023. Interested Faculty of our College and other Colleges shall register their names through Registration link (<https://tinyurl.com/2c425han>), on or before 30.06.2023

  
Coordinator

  
HoD

#### **Copy To**

All HoDs / Aero, Civil, CSE, ECE, EEE, EIE, Marine, Mech& Auto, Mechanical, MBA, MCA & SOBES.

Principal

Executive Director

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## Department of Computer Science and Engineering

Date: 13.07.2022

### Five days Online Faculty Development Program on “BlockChain Technology”

#### Content of the FDP

- Fundamentals of Block Chain Technology
- Block Chain Security
- Block Chain Technology for Advertising
- Block Chain Technology in Food Industry
- Block Chain Technology in HealthCare

#### Proposed List of Experts to Deliver Lecture:

S.No	Expert Name	Designation	Institution Name
1.	Dr. G.Gifta Jerith	Assistant Professor/CSE	AI & ML School of Engineering, Malla Reddy University, Hyderabad
2.	Dr. M. Gayathri Santhosh	Project Associate (Research)	Department of Cryptology and Computing Sets, Chennai
3	Dr.KiranBabu	Professor & HoD/CSE	MVJ College of Engineering, Bangalore
4	Dr.S.Balakrishnan	Professor & HoD/CSE	Sri Krishna College of Engineering & Technology, Coimbatore
5.	Dr.Jesu Vedha Nayahi	Assistant Professor (SG), CSE	Anna University Regional Campus, Tirunelveli



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**Department of Computer Science and Engineering**

**Five days Online FDP on “BlockChain Technology”**

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109	kjanakipriya22@gmail.com	Dr JANAKI PRIYA K	8012999224	AlagappaGovt Arts College Karaikudi

  
 Event Coordinator

  
 HOD/CSE



**PSN COLLEGE OF ENGINEERING AND TECHNOLOGY**  
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279009

**Report of the Event**

Title of the Event	<b>Faculty Development Programme on “BlockChain Technology”</b>
Date & Time	03.07.2023 to 07.07.2023
Name(s) of the Resource Persons	<b>Dr.G. Giftha Jerith, Assistant Professor/CSE</b> AI & ML School of Engineering, Malla Reddy University, Hyderabad <b>Dr.M. Gayathri Santhosh, Project Associate(Research)</b> Department of Cryptology and Computing Sets, Chennai <b>Dr. Kiran Babu, Professor &amp; HoD / CSE</b> MVJ College of Engineering, Bangalore <b>Dr.S.Balakrishnan, Professor &amp; HoD / CSE</b> Sri Krishna College of Engineering & Technology, Coimbatore <b>Dr.Jesu Vedha Nayahi, Assistant Professor (SG)/CSE</b> Anna University Regional Campus, Tirunelveli
Name of the Event Coordinators	Mr.G.Sivakumar AP/CSE & Mrs.H.Jeyalakshmi, AP/CSE, PSN College of Engineering and Technology
No. of Participants	109
<b>Event Outcomes</b>	
Upon the completion of this FDP, the Faculty members will able to know <ul style="list-style-type: none"> <li>Basic knowledge of BlockChain Technology and its Security and also the need for Block Chain Technology in Advertising, Food Industry and HealthCare.</li> </ul>	
<b>Remarks of the Coordinator about the Event</b>	
A Five days FDP was organized by the Department of Computer Science and Engineering from 03-07-2023 to 07-07-2023. Mr.G.Sivakumar AP/CSE & Mrs.H.Jeyalakshmi, AP/CSE, Assistant Professor/CSE was the Event Coordinators and <b>Dr. G. Giftha Jerith</b> , AI & ML School of Engineering, Malla Reddy University, Hyderabad, <b>Dr. M. Gayathri Santhosh</b> , Department of Cryptology and Computing Sets, Chennai, <b>Dr. Kiran Babu</b> , MVJ College of Engineering, Bangalore, <b>Dr. S. Balakrishnan</b> , Sri Krishna College of Engineering & Technology, Coimbatore, <b>Dr. Jesu Vedha Nayahi</b> , Anna University Regional Campus, Tirunelveli are the resource persons of this Five days FDP. However, 109 faculty members were participated, benefitted and received their participant Certificates. The objective of the FDP was to provide the Basic knowledge of Block Chain Technology and its Security and also the need for Block Chain Technology in Advertising, Food Industry and HealthCare. Faculty members were impressed and got benefitted.	

Date: 13.07.2023

Event Coordinator

*[Signature]*  
HoD

*[Signature]*

Principal



# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY



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Melathediyoar, Tirunelveli-627152, Tamilnadu, INDIA



## Department of Computer Science and Engineering

### Online Faculty Development Programme

# Block Chain Technology

Five Days - 3rd to 7th July 2023



Dr. G. Giftha Jerith,  
AI&ML School of Engineering,  
Malla Reddy University, Hyderabad

Day-1

Day-4



Dr. S. Balakrishnan  
Sri Krishna College of Engineering  
and Technology  
Coimbatore



Dr. Gayathri Santhosh M  
Department of Cryptology and  
Computing Sets  
Chennai

Day-2

Day-5



Dr. Jesu Vedha Nayahi  
Anna University Regional Campus,  
Tirunelveli



Dr. Kiran Babu,  
MVJ College of Engineering  
Bangalore

Day-3

E-materials & E-Certificate will be provided

No. of Participants is limited (Max 50)

Selection based on First Come and First Serve Basis

Registration Link : <https://tinyurl.com/2c425han>



Coordinators : 9597263105 / 9944048528

No Registration Fee

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## DAY 1 – 03.07.2023

<b>Resource Person</b>	<b>Dr. G. Giftha Jerith., AP/CSE</b> AI & ML School of Engineering, Malla Reddy University, Hyderabad
<b>Topic</b>	<b>Fundamentals of BlockChain Technology</b>



### Fundamentals of Blockchain Technology Day-1 (03-07-2023)

Dr.G.Giftha Jerith  
AP/CSE(AI&ML)  
Malla Reddy University  
Hyderabad

#### Overview

- Why Blockchain?
- History of Blockchain Technology
- Definition
- How does Blockchain work?
- Block Creation
- Application Areas

#### History of Blockchain Technology

- 1991 - Stuart Haber & Scott Stornetta - Timestamping
- 1993 - David Chaum - Ecash
- 1998 - Nick Szabo - GOD Protocol
- 2004 - Hal Finney - RPoW
- 2008 - Satoshi Nakamoto - Bit Coin
- Blockchain → Underlying technology behind cryptocurrency.

Close

Participants (30)

Search

- S Sivakumar.G (me)
- DJ Dr.G.GIFTA JERITH,MRU,... (Host)
- A A.Enitha
- AS AMUTHAVALLI S
- AJ Angelin J
- AR Anitha R
- B BALAGANESH
- BG Booma G,AP/CSE
- DA Dr A.Vidhyalakshmi
- DN Dr. N. Nisha Rosebel
- DA Dr.E.A.Mohamed Ali
- D Dr.P.Shenbagavalli

Invite

Close

Participants (30)

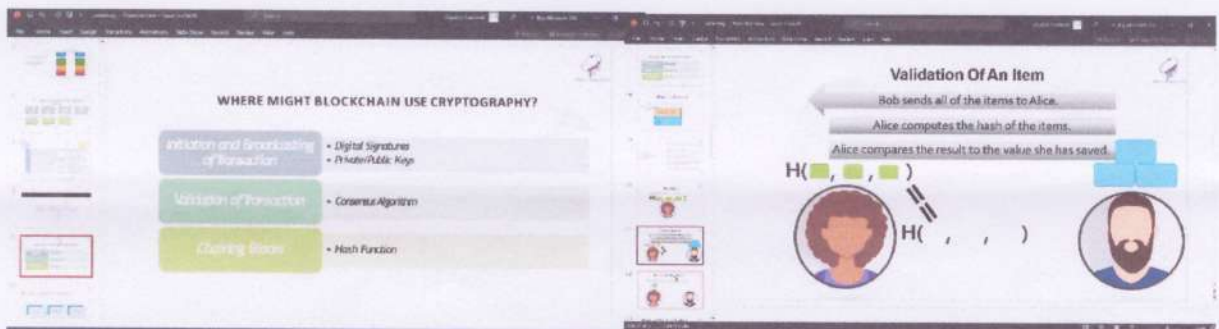
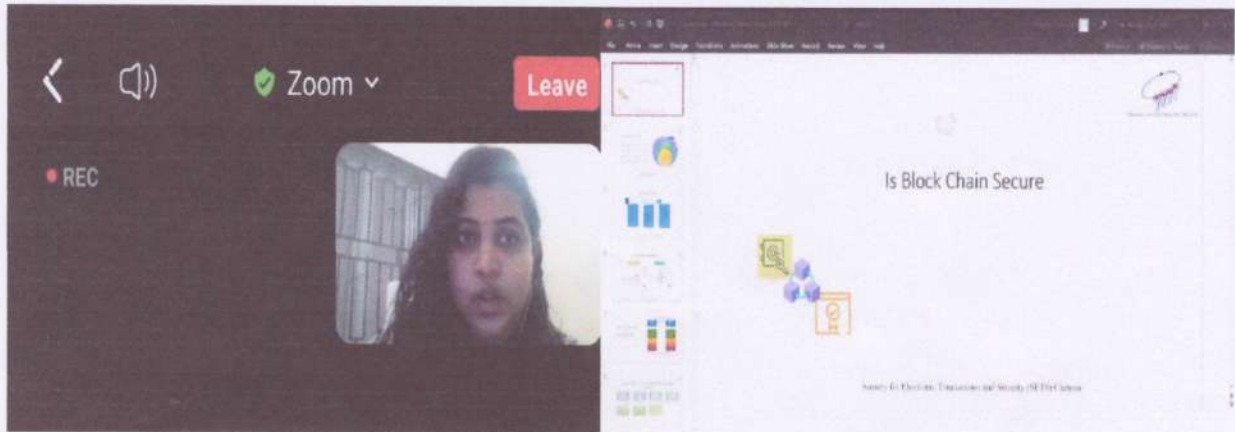
- PK P Kanagalakshmi AP/CSE
- Princy Suganthi Bai S
- PSN
- Rathna Mala
- SY SHEELA Y
- SA Shenbagharaman A
- S Shunmugapriya
- SN Somasundaram N AP/ECE
- SA Suja Alphonse A
- SS Sweetlin susilabai S
- TS THANGA SELVI R
- VV vivo V2202
- T Taurshia

Invite



## DAY 2 – 04.07.2023

<b>Resource Person</b>	<b>Dr. M. Gayathri Santhosh, Project Associate (Research)</b> Department of Cryptology and Computing Sets, Chennai
<b>Topic</b>	<b>BlockChain Security</b>



Close	Participants (36)	Close	Participants (34)
Search			
PSN (me)		Rathna Mala	
Gayathri (Host)		Ruby Elizabeth J	
A.Enitha		Somasundaram N	
AS AMUTHAVALLI S		SuJa Alphonse A	
AJ Angelin J		SWEETLIN SUSILABAI S	
AR Anitha R		Vijayaraj N	
AT ANTONY TAURSHIA		Vinothini Mary	
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BG Booma G,AP/CSE		Kesavan R	
DA Dr A.Vidhyalakshmi		nivedha manoj	
DN Dr. N. Nisha Rosebel		Shenbagharaman A	
DS Dr. Sanjith		Sivakumar	
SA Dr E A Mohamed Ali		Sujitha Srinivasan	
		Invite	

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**DAY 3 – 05.07.2023**

<b>Resource Person</b>	<b>Dr. Kiran Babu, Professor &amp; HoD / CSE</b> MVJ College of Engineering, Bangalore
<b>Topic</b>	<b>BlockChain Technology for Advertising</b>



Close

Participants (29)

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- DK Dr Kiran Babu T S (Host)
- PSN
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- A A.Enitha
- AS AMUTHAVALLI S
- AJ Angelin J
- DS Dr. Sanjith
- D DR.P.SHENBAGAVALLI
- G G.Princely
- JS Jenifus Selvarani A
- J JEYALAKSHMI.H

Invite

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- RE Ruby Elizabeth J
- SJ Shalini John
- SY SHEELA Y
- SN Somasundaram N
- SA Suja Alphonse A
- SS SWEETLIN SUSILABAI S
- VM Vinodhini Mary
- C Carolin
- G G.Indra
- KR Kesavan R
- NM nivedha manoj
- SA Shenbagharaman A

Invite

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*[Handwritten signature]*



## DAY 4 – 06.07.2023

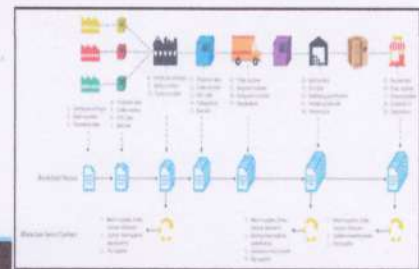
<b>Resource Person</b>	<b>Dr.S. Balakrishnan, Professor &amp; HoD / CSE</b> Sri Krishna College of Engineering & Technology, Coimbatore
<b>Topic</b>	<b>BlockChain Technology in Food Industry</b>



Dr.S.Balakrishnan



### 2. Importance of Blockchain Technology in the Food Industry



### 3. Benefits of Blockchain Technology in the food Industry

1. Strengthen Supply Chain Management
2. Mitigate food fraud while protecting the brand
3. Built trust and loyalty of consumers
4. Food supervision
5. Prevents price coercion
6. Prevents food wastage
7. Sustainability
8. Integration with Enterprise resource planning (ERP) and Internet of things (IoT)

### 4. Application of blockchain in food industry

- It will streamline the supply chain, reducing retailers' costs
- It offers simpler regulatory compliance
- It will enhance and expedite the food recall process
- It will enable \$31 billion in food fraud savings globally by 2024.

### 5. Five Blockchain companies improving the food industry

1. TRANSPARENT PATH
2. IBM
3. RIPE.IO
4. GREENFENCE
5. HUNGRY COIN

**Participants (17)**

Search

- S Sivakumar.G (mod)
- D Dr.S.Balakrishnan (Host)
- A A Enitha
- A Arun Kumar
- DP D. Ponmary Pushpa Latha
- DA Dr A. Vidhyalakshmi
- DA Dr.E.A.Mohamed Ali
- D DR.PSHENBAGAVALLI
- G G.Indra
- J JEYALAKSHMI.H
- K Kasi
- PSN PSN

Invite

**Participants (28)**

Search

- K Kasi
- M Manikandan.k
- PSN PSN
- R Rathna Mala
- RE Ruby Elizabeth J
- S S.Amuthavalli
- SN Somasundaram N
- SB Suresh Babu
- VM Vinodhini Mary W
- AR Anitha R
- KR Kesavan R
- PL Poorna lekha
- SA Shenbagharaman A

Invite

*P. Chel*

*[Handwritten signature]*

## DAY 5 – 07.07.2023

<b>Resource Person</b>	<b>Dr. Jesu Vedha Nayahi, Assistant Professor (SG)/CSE</b> Anna University Regional Campus, Tirunelveli
<b>Topic</b>	<b>BlockChain Technology in HealthCare</b>

<
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Leave

**BLOCKCHAIN  
IN  
HEALTHCARE**

Dr. J. Jesu Vedha Nayahi  
Senior Assistant Professor  
Department of Computer Science and Engineering  
Anna University Regional Campus - Tirunelveli

**Healthcare Sector**

- One of the largest sectors in terms of revenue and employment
- Comprises
  - Hospitals
  - Medical Services
  - Manufacturing of Medical Equipment
  - Production of Drugs
  - Medical Insurance
  - Provision of Healthcare to Patients
  - Medical Tourism
  - Tele Medicine

**Health Sector in India**

**Global Demand**

- Healthcare market in India is expected to reach US\$ 516.6m by 2023
- As of 2019, the Indian healthcare sector is one of India's largest employers, as it employs a total of 22.2 million people.

**Attractive Opportunities**

- In the Economic Survey of 2023, India's public expenditure on healthcare stood at 2.1% of GDP in 2021-22.
- Bharat Covaxin
- Biotech's

**Policy and Government Support**

- In the Union Budget 2023-24, the government allocated Rs. 89,155 crore to the Ministry of Health and Family Welfare (MoFW).

**Participants (27)**

Search

- S Sivakumar.G (me)
- J Jesu Vedha Nayahi J. (Host)
- A A.Enitha
- AS AMUTHAVALLI S
- Arun Kumar
- B BALAGANESH
- BG Booma G,AP/CSE
- DP D. Ponmary Pushpa Latha
- DA Dr A.Vidhyalakshmi
- DS Dr. Sanjith
- DA Dr.E.A.Mohamed Ali
- D DR.P.SHENBAGAVALLI

Invite

**Participants (27)**

Search

- J JEYALAKSHMI.H
- KR Kesavan R
- M M.Suji
- M Manikandan k
- PSN
- RS Reeta shaktivel
- RE Ruby Elizabeth J
- SY SHEELA Y
- SN Somasundaram N
- SA Suja Alphonse A
- VM Vinothini Mary
- 2J 2 J Macklin Abraham Navamani
- AR Anitha R

Invite

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*[Handwritten Signature]*



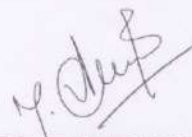
# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

Tirunelveli - 627 152, Tamilnadu  
(An Autonomous Institution, Accredited by NAAC with A+ Grade  
Affiliated to Anna University)

7XKBEG-CE000005

This is to certify that Mr. / Ms. / Dr. SIVAKUMAR G  
PSN College of Engineering and Technology

has participated in 5 days Faculty Development Programme on **"Blockchain Technology"**  
organized by **Department of Computer Science and Engineering** in association with  
**CSI Students Chapter** from 03.07.2023 to 07.07.2023. This was a virtual programme  
conducted through Zoom.

  
DR. M. VARGHEESE  
HOD/CSE



  
DR. V. MANIKANDAN  
Made for free with Certify'em





# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

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Web site: [www.psnecet.ac.in](http://www.psnecet.ac.in) Email: [principal@psnecet.ac.in](mailto:principal@psnecet.ac.in)

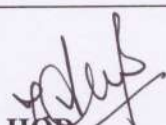
Phone. No: 04634-279009



## Department of Computer Science and Engineering

### Faculty Development Program Outcomes(POs)

PO'sNo	KNOWLEDGE	Mapping	Topics
1	EngineeringKnowledge	3	Introduction About Block Chain Technology
2	ProblemAnalysis		
3	Design /DevelopmentofSolutions	2	Smart Contract in Block Chain
4	ConductInvestigations ofComplexProblems		
5	ModernToolusage	3	Block Chain Advertising Tool & Security
6	TheEngineerandSociety		
7	Environment andSustainability		
8	Ethics		
9	IndividualandTeamWork		
10	Communication		
11	ProjectManagementandFinance		
12	Life-longLearning	2	Security in Block Chain

  
HOD

  
Principal



# PSN College of Engineering and Technology (Autonomous)

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## Department of Computer Science and Engineering

07-08-2023

Submitted to Principal,

This is to inform you that our Computer Science and Engineering department has planned to conduct **Technical Seminar** on the topic of “**ChatGPT with AI**” on 10-08-2023 for all Final Year Students.

In this regard. Kindly give permission to conduct the same.

Dept Event Coordinator

HOD

IQAC Co-ordinator

Principal

---

### Vision [Institute]

*Emerge as a pioneer institute inculcating engineering education and skills, research, values and ethics.*

### Vision [Department]

*To emerge as a preeminence program to produce quality Computer Science and Engineering graduates*

**PARTICIPANTS ATTENDANCE**

<b>S.NO</b>	<b>Register Number</b>	<b>Students Name</b>	<b>Signature</b>
1.	2003001	ABIRAMI K	
2.	2003002	ABISHEK H	
3.	2003005	ARAVINTH K	
4.	2003007	BHARATHKUMAR M	
5.	2003008	BOOPATHI RAJA A	
6.	2003009	CHITRADEVI B	
7.	2003010	DEVA B	
8.	2003011	DOSS ANTONY SANTHOSH A	
9.	2003012	DURGESWARAN G	
10.	2003014	ESTHER V	
11.	2003016	GOWSALYA S	
12.	2003017	HIRUSHIKESHAN K	
13.	2003018	INFANT OSWIN P	
14.	2003019	JAYAGANESH J	
15.	2003020	JEEVA K	
16.	2003021	JEEVAPRIYASHARNI M	
17.	2003022	JOSEPH SAIMAN L	
18.	2003023	KALAISELVI M	
19.	2003025	KANAGALAKSHMI A	
20.	2003026	KARTHIKAISELVAN K	
21.	2003027	KARTHIKEYAN K	
22.	2003028	KAVIYA M	
23.	2003029	KOMURAJ M	

---

**Vision [Institute]**

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research, values and ethics.*

**Vision [Department]**

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Engineering graduates*



24.	2003030	KUMARESAN S	
25.	2003032	MAHADEVI R	
26.	2003033	MAHESHWARI M	
27.	2003035	MANISHA V	
28.	2003036	MARI MAGESH R	
29.	2003038	MARISELVAM K	
30.	2003040	MATHANKUMAR M	
31.	2003041	MATHI M	
32.	2003044	NALLAIYA B	
33.	2003045	PERARI KRISHNAN K	
34.	2003048	POONKANI K	
35.	2003049	S.PRABHUMUKILAN	
36.	2003050	PRATHESHA M	
37.	2003051	PRIYADHARSHINI B	
38.	2003052	PRIYADHARSHINI P	
39.	2003053	RAJESH J	
40.	2003054	ROBIN R	
41.	2003055	ROSARIYOINBARAJ I	
42.	2003056	SAIKUMAR S	
43.	2003057	SAKTHI RAM M	
44.	2003058	SANKAR GANESH S	
45.	2003059	SANTHOSH M	
46.	2003060	SATHISKUMAR M	
47.	2003061	SHANMUGAPRIYA K	
48.	2003062	SHIVANI MAHALAKSHMI C	

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**Vision [Department]**

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49.	2003063	SIVA SANKARAN S	
50.	2003064	SIVAPRIYA M	
51.	2003066	SRINIVASAN T	
52.	2003067	SRISUGIN M	
53.	2003068	SUBASHINI M	
54.	2003069	SUJIN RAHUL R	
55.	2003070	SUNDHARSIVA B	
56.	2003071	SUNILKUMAR S	
57.	2003072	SURESH T	
58.	2003073	SURYA PRAKASH A	
59.	2003074	SWETHA S	
60.	2003076	THIRUPATHYBALAJI D	
61.	2003078	VARSHA C	
62.	2003080	VENNILA A	
63.	2003081	VINAYAGAMOORTHY G	
64.	2003301	ANUVAISHNAVI.B	
65.	2003303	CHITRA.R	
66.	2003308	KRISHNAKUMARI C	
67.	2003310	MERISON S	
68.	2003314	SANGEETHA D	
69.	2003315	SELVARAJ P	
70.	2003316	SURYA R	
71.	2003317	VIJAYSON I	
72.	2003318	WELSON P	

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**Vision [Department]**

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Engineering graduates*



## **Resource Person One Page Profile**

**Name of the Resource Person:** Mrs.H.Jeyalakshmi

**Designation :** Assistant Professor

**Institution/Company :** PSN College of Engineering & Technology,  
Tirunelveli

**Area of Expertise :** Image Processing, Internet of Things.

**Working Experience (Industry/**

**Academic Institution) :** 9 Yrs

**Publication Details of Academician/Industry Resource Person:**

**Published 3 papers in International Journals**

---

**Vision [Institute]**

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Phone. No: 04634-

279009

## Department of Computer Science and Engineering

### Report of the Event

Title of the Event	<b>Seminar on Current Topic - 2 “ChatGPT with AI”</b>
Date & Time	10.08.2023 & 2.00 PM to 3.30 PM
Name(s) of the Resource Persons	Mrs.H.Jeyalakshmi, Assistant Professor, PSN College of Engineering & Technology, Tirunelveli.
Area of Specialization	Image Processing, Internet of Things & Network Security
Name of the Event Coordinator	Mr. G. Sivakumar, Assistant Professor, PSN College of Engineering and Technology
No. of Participants	72
<b>Event Outcomes</b>	
Upon the completion of this course, Students will able to	
➤ Know about the Recent developments in ChatGPT with Artificial Intelligence.	
<b>Remarks of the Coordinator about the Event</b>	
A One Day Seminar was organized by the Department of Computer Science and Engineering on 10.08.2023. Mr. G. Sivakumar, Assistant Professor/CSE was the event coordinator.	
However, 90 students participated and benefitted. The objective of the seminar was to elaborate on how ChatGPT ruled out the world combined with Artificial Intelligence. Students were impressed by the way the speaker delivered.	

**Date: 10.08.2023**

**Event Coordinator**

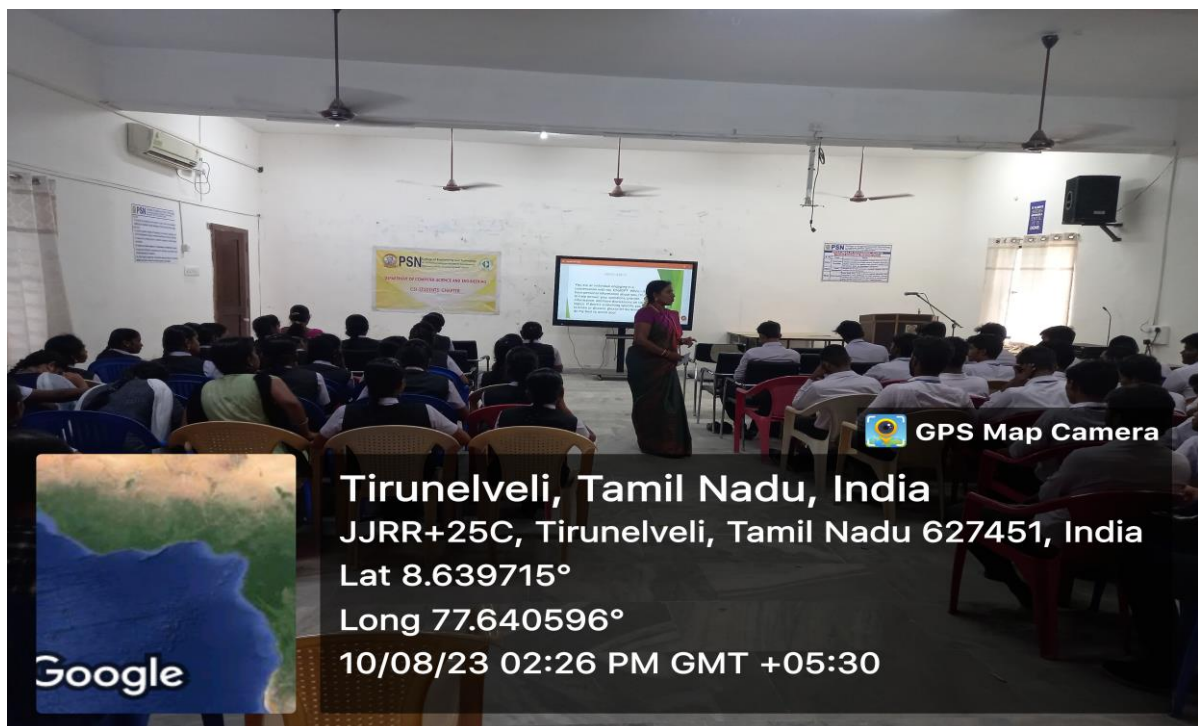
#### **Vision [Institute]**

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#### **Vision [Department]**

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**Figure: Seminar on Current Topic - 2 “ChatGPT with Artificial Intelligence”**

**Vision [Institute]**

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**Vision [Department]**

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Phone. No: 04634-

279009

## Department of Computer Science and Engineering

### Seminar Program Outcomes (POs)

PO's No	KNOWLEDGE	Mapping	Topics
1	Engineering Knowledge	3	Introduction About ChatGPT
2	Problem Analysis	3	Analyse more complicated problems
3	Design /Development of Solutions		
4	Conduct Investigations of Complex Problems		
5	Modern Tool usage	3	Natural Language Processing Tool used
6	The Engineer and Society		
7	Environment and Sustainability		
8	Ethics		
9	Individual and Team Work		
10	Communication	3	Facilitating communication across different categories
11	Project Management and Finance		
12	Life-long Learning	2	Canva , Duolingo Integrating ChatGPT

Event Coordinator

HOD

Principal

#### Vision [Institute]

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Phone. No: 04634-279009

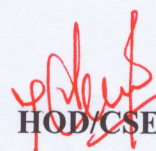
Date: 10.08.2023

## CIRCULAR

Sub: Conducting Seminar on “The role of Artificial Intelligence in modern technology”-Reg.

This is to inform you that we have decided to conduct a Seminar on “The role of Artificial Intelligence in modern technology” on 11.08.2023 by 11.30AM to 1PM. Mr.K.Puthiyavan, Madhura IT Solutions, Cheranmahadevi will take seminar with hands-on training for the AI Club members.

G. B.  
10/8/2023  
Coordinator

  
HOD/CSE





## PARTICIPANTS ATTENDANCE

S.No	Register No	Students Name List	Signature
1	2003001	ABIRAMI K	A. Abirami
2	2003002	ABISHEK H	H. Abishek
3	2003007	BHARATHKUMAR M	M. Bharath
4	2003009	CHITRADEVI B	B. Chitra
5	2003014	ESTHER V	V. Esther
6	2003017	HIRUSHIKESHAN K	K. Hirushikeshan
7	2003019	JAYAGANESH J	J. Jayaganesh
8	2003021	JEEVAPRIYASHARNI M	M. J. S. S. S.
9	2003023	KALAISELVI M	M. K. S. S.
10	2003025	KANAGALAKSHMI A	A. Kanagalakshmi
11	2003028	KAVIYA M	M. Kaviya
12	2003029	KOMURAJ M	M. Komuraj
13	2003030	KUMARESAN S	S. Kumaresan
14	2003032	MAHADEVI R	R. Mahadevi
15	2003035	MANISHA V	V. Manisha
16	2003036	MARI MAGESH R	R. Mari Magesh
17	2003041	MATHI M	M. Mathi
18	2003052	PRIYADHARSHINI P	P. Priyadharshini
19	2003054	ROBIN R	R. Robin
20	2003056	SAIKUMAR S	S. S. S. S.
21	2003059	SANTHOSH M	M. Santhosh
22	2003062	SHIVANI MAHALAKSHMI C	C. Shivani
23	2003063	SIVA SANKARAN S	S. S. S. S.
24	2003064	SIVAPRIYA M	M. Sivapriya
25	2003068	SUBASHINI M	M. Subashini
26	2003070	SUNDHARSIVA B	B. Sundharsiva
27	2003074	SWETHA S	S. Swetha
28	2003078	VARSHA C	C. Varsha
29	2003080	VENNILA A	A. Vennila
30	2003081	VINAYAGAMOORTHY G	G. Vinayagamorthy
31	2003301	ANUVAISHNAVI B	B. Anuvaishnavi
32	2003303	CHITRA R	R. Chitra
33	20033017	VIJAYSON	S. Vijayson

Vision [Institute]

Emerge as a pioneer institute inculcating engineering education and skills,  
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Vision [Department]

To emerge as a preeminence program to produce quality Computer Science and  
Engineering graduates



## Resource Person One Page Profile

**Name of the Resource Person:** Mr.K.Puthiyavan

**Designation :** Admin Tutor

**Institution/Company :** Madhura IT Solutions, Cheranmahadevi

**Area of Expertise :** Machine Learning, Full stack  
development with Python, Java MERN and MEAN  
Development

**Working Experience (Industry/**

**Academic Institution) :** 11 years

**Publication Details of Academician/Industry Resource Person: Nil**

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**Vision [Institute]**

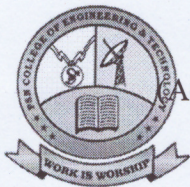
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Phone. No: 04634-279009

## Department of Computer Science and Engineering

### Report of the Event

Title of the Event	Technical Seminar on “The role of Artificial Intelligence in modern technology”
Date & Time	11.08.2023 & 11.30AM to 1.00PM
Name(s) of the Resource Persons	Mr.K.Puthiyavan, Madhura IT Solutions, Cheranmahadevi.
Area of Specialization	React native (Hybrid mobile app) ,Flutter (Hybrid mobile app), Web and Mobile application development
Name of the Event Coordinator	Ms. G. Booma, Assistant Professor, PSN College of Engineering and Technology
No. of Participants	33
<b>Event Outcomes</b>	
Upon the completion of this course, Students will able to	
➤ Know about the Recent Technical Challenges in Artificial Intelligence	
<b>Remarks of the Coordinator about the Event</b>	
A One Day Technical Seminar was organized by the Department of Computer Science and Engineering on 11.08.2023. Ms. G. Booma, Assistant Professor/CSE was the event coordinator.	
However 33 students were participated and benefitted. The objective of the seminar was to how artificial intelligence used now a days in modern technology. Students were impressed about the way the speaker delivered.	

Date: 14.08.2023

*[Signature]*  
14/8/23

*[Signature]*  
14/8/23

*G. Booma*  
14/8/2023  
Event Coordinator

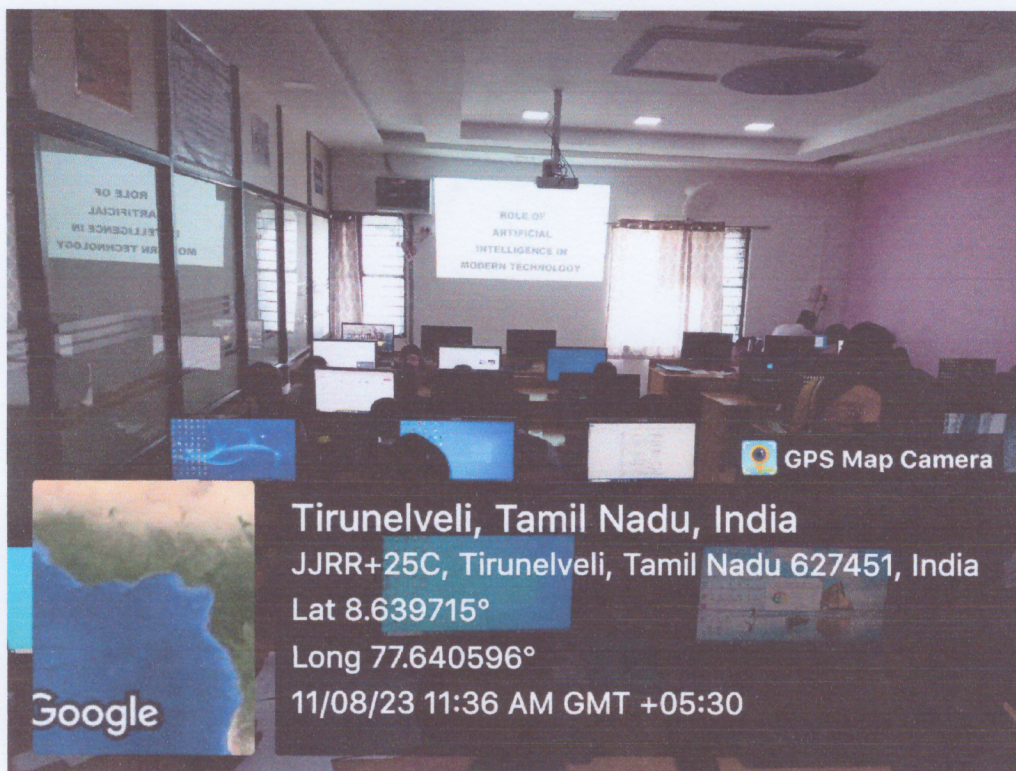
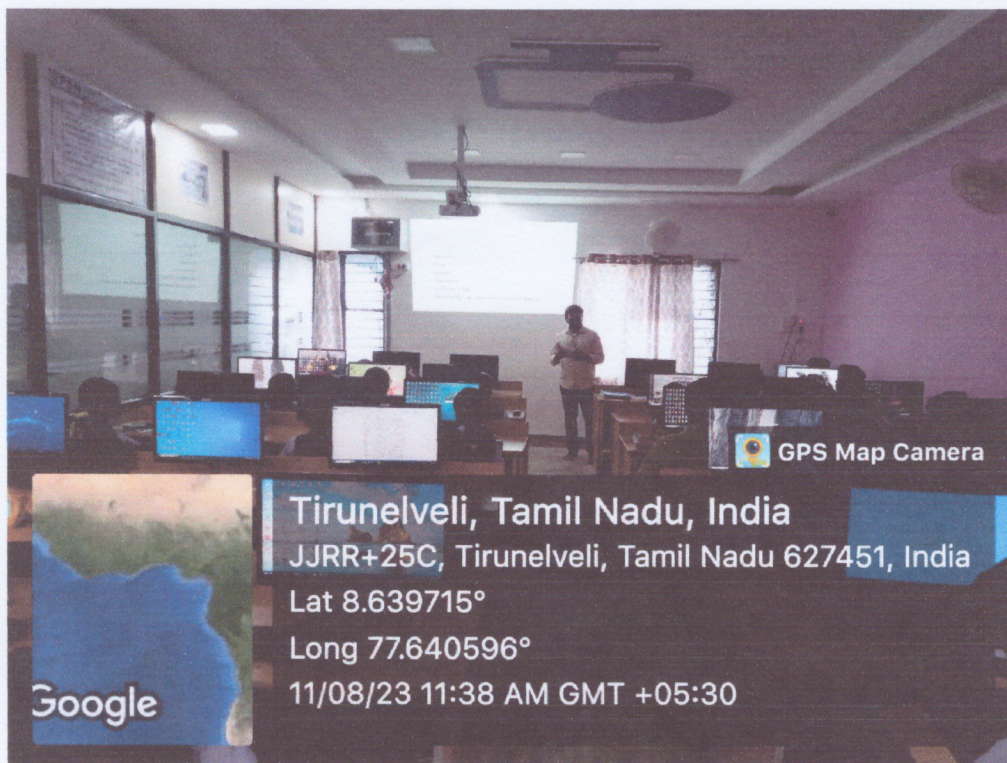
### Vision [Institute]

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### Vision [Department]

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**Figure: Technical Seminar on “The role of Artificial Intelligence in modern technology”**

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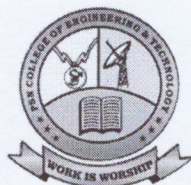
**Vision [Institute]**

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Phone. No: 04634-279009

## Department of Computer Science and Engineering

### Technical Seminar Program Outcomes (POs)

PO's No	KNOWLEDGE	Mapping	Topics
1	Engineering Knowledge	3	Role of Artificial Intelligence
2	Problem Analysis	2	Automatic content generator for user's queries
3	Design /Development of Solutions	3	Develop our own AI ChatBot
4	Conduct Investigations of Complex Problems		
5	Modern Tool usage	2	Sublime Editor
6	The Engineer and Society		
7	Environment and Sustainability		
8	Ethics		
9	Individual and Team Work		
10	Communication		
11	Project Management and Finance		
12	Life-long Learning	2	About Artificial Intelligence to generate AI applications

G. B. 14/8/2023  
Event Coordinator

HOD

14/8/23  
Principal

#### Vision [Institute]

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**FACULTY DEVELOPMENT PROGRAMME**

**MARITIME ENGINEERING**

**(26<sup>TH</sup> JUNE – 02<sup>ND</sup> JULY 2023)**

**A REPORT**

*Submitted by*

**Dr. M. Muruganandam, Associate Professor and Coordinator**



**Department of Marine Engineering**

**(A2 Grade by DG Shipping Mumbai)**

**PSN College of Engineering and Technology**

**(An Autonomous Institution recognized by AICTE and affiliated to Anna University,**

**Accredited with A+ Grade by NAAC in the Third Cycle)**

**Melathediyoore – 627 152, Tirunelveli District, Tamil Nadu**

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## Overview of Faculty Development Programme on Maritime Engineering

The Virtual Faculty Development Programme (FDP) on Maritime Engineering was conducted for one week from 26<sup>th</sup> June 2023 to 02<sup>nd</sup> July 2023. The activities of the FDP Coordinator during this programme consisted of (1) Organizing the programme, (2) Conducting the programme, (3) Monitoring the attendance of participants, and (4) Report preparation.

FDP announcement was made by sending the Programme Brochure and Programme Schedule by email to various engineering institutions all over India. About 60 candidates from the following institutions registered for FDP: PSN College of Engineering and Technology, Noorul Islam Centre for Higher Education, College of Ship Technology, Indian Maritime University, Anglo-Eastern Maritime Academy, Indian Maritime University, Kolkata Campus, Institute of Marine Education and Research, Patna, Mohamed Sathak Engineering College, Odisha Maritime Academy, Sri Venkateswara College of Engineering, Maharashtra Academy of Naval Education and Training, Pune, Indian Maritime University, Kochi Campus, Vels Institute of Science, Technology, & Advanced Studies, and AMET University.

Excluding Saturday and Sunday (holidays), the programme schedule was done for five working days with two sessions on each day (Sessions 1-10). Session 4 was canceled because the expert was busy with his other commitments. Session 9 was canceled because enough participants did not turn up. Attendance of participants for a total of 8 sessions was monitored. The consolidated attendance report is shown on pages 5 and 6. The average attendance is 34.5 % (see pages 5 and 6). The number of participants who have attended all the sessions is 9. See the list of participants on pages 5 and 6 (highlighted with green). The number of participants who have less than 75 % attendance is 45. See the list of participants on pages 5 and 6 (highlighted in red). Reports for 8 sessions are given on pages 7 to 48. Feedback was received from twenty-six participants of FDP. A feedback analysis report is presented on pages 49 to 55.

*M. Muruganandam*

M. Muruganandam, Ph.D.  
Associate Professor and FDP Coordinator  
Department of Marine Engineering  
PSN College of Engineering of  
Technology Melathediyoore – 627 152  
24<sup>th</sup> July 2023





### Attendance Report

Sl. No.	Name	Total number of sessions is 8	
		Present	Percentage
1	Dr. A. PACKIA ANTONY AMALAN	3	38
2	Mr. P. ATHI NARAYANAN	0	0
3	Mr. A. C. MARIAPPAN	0	0
4	Mr. ASHIK RAHMAN A. (STUDENT)	2	25
5	Mr. ASHISH SHARMA (STUDENT)	0	0
6	Dr. K. S. JAI AULTRIN	3	38
7	Mr. TEJINDER P. S. BHAMRA	8	100
8	Mr. BAIDYANATH SARKAR	8	100
9	Capt. MANOJ KUMAR	8	100
10	Mr. D. LOGESH	0	0
11	Capt. S. T. SREEDHARAN	6	75
12	Ms. J. DIVYA JOHNS	8	100
13	Dr. DEEPAK MISHRA	4	50
14	Mr. HARIARUNACHALAM S.	0	0
15	Dr. R. SATHEESH RAJA	3	38
16	Mr. C. INDRAKUMAR	0	0
17	Dr. V. K. JEBASINGH	8	100
18	Mr. JESON J. S.	3	38
19	Mr. A. KASIVISWANATHAN	3	38
20	Dr. K. CHANDRASEKAR	0	0
21	Mr. MANAS RANJAN BEHURA	4	50
22	Mr. A. MOHAN	7	88
23	Mr. VINOTH KUMAR N.	1	13
24	Mr. DINESH M.	0	0
25	Dr. M. GOPI KRISHNA	0	0
26	Mr. GHARSHOM F. (STUDENT)	0	0
27	Mr. MUNIASAMY M.	5	63
28	Mr. M. MURUGAN	0	0
29	Mr. NIKHIL MARUTI KUNJIR	5	63
30	Mr. G. PETERPACKIARAJ	0	0
31	Dr. P. PAUL PANDIAN	0	0
32	Mr. PRABHAKARAN M.	0	0
33	Mr. PRAY GIFT DAVIDSON	0	0
34	Capt. PRERIT MISRA	8	100
35	Capt. AMOL BHASKAR ATHALYE	8	100
36	Mr. P. SURENDAR	0	0
37	Mr. RAJESH S. JAGTAP	0	0
38	Mr. A. K. RATHEESH	0	0
39	Mr. R. KARUTHAPANDI	0	0
40	Mr. SATHEESH BABU K.	0	0



41	Mr. S. MANIVANNAN	6	75
42	Mr. THANGAVELU G.	0	0
43	Ms. SHABNAM PARVEEN	7	88
44	Mr. SHRIKANT U. GUNJAL	7	88
45	Mrs. R. SINDHUJA	0	0
46	Dr. S. JOHN LEON	7	88
47	Mr. S. RAJA	0	0
48	Mr. SREEJITH C. S.	5	63
49	Ms. T. SUBHASHINI	5	63
50	Mr. MAJENDRAN GOPINATH	8	100
51	Mr. SURAJIT GHOSH	8	100
52	Mr. SUSHIL KR. JHA	4	50
53	Mr. P. THAVARAJAN	0	0
54	Mr. ROHITH AMBADI S.	2	25
55	Mrs. THILAGAPATHY G.	0	0
56	Mr. TIMMY JOSEPH (STUDENT)	0	0
57	Mr. TUSHAR R. WAGHMARE	0	0
58	Mr. VIJAY D. PATIL	0	0
59	Mr. VIKRAMOORTHY A.	0	0
60	Mr. VISHNU S. H.	1	13



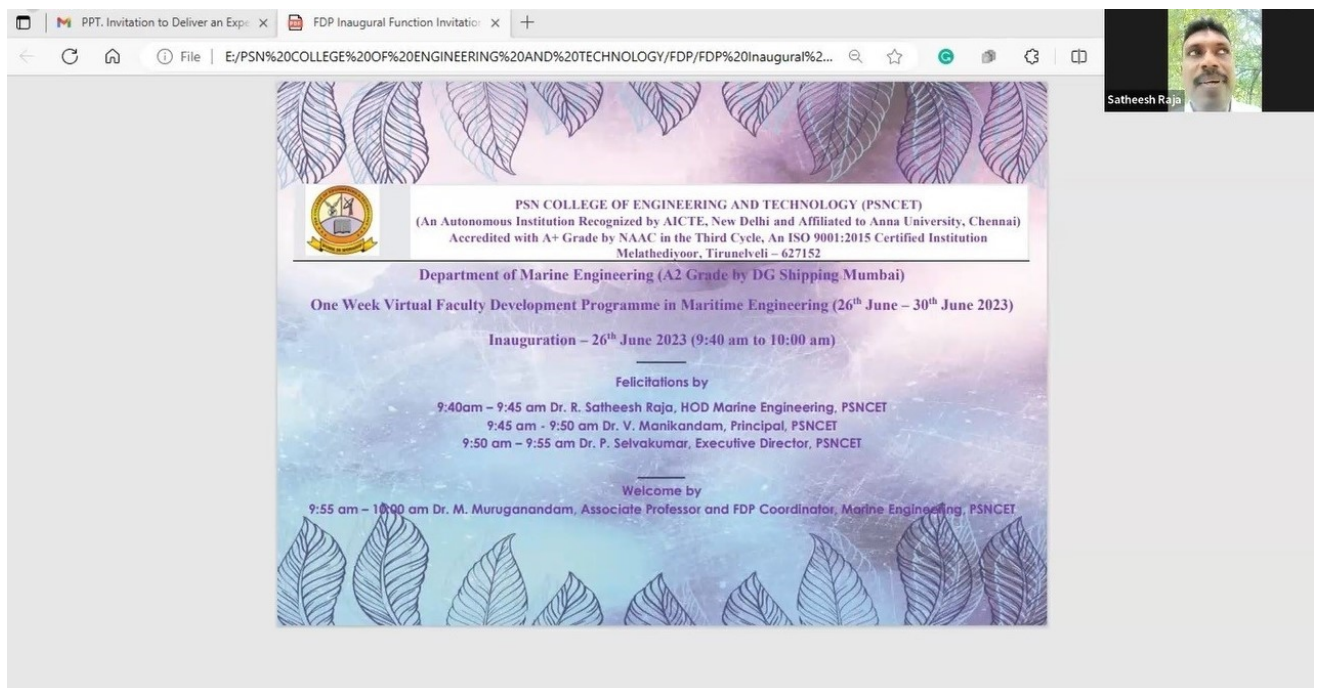


**Day 1                      26.06.2023, Monday**

**Session 1A              9:40-10:00 Hrs.**

***Inaugural Function – Felicitation Address by HOD Marine Engineering and Principal of PSNCET and Welcome Address by FDP Coordinator***

Faculty Development Programme (FDP) on Maritime Engineering scheduled on 26.06.2023 at 9:40 a.m. was started with a felicitation address by Dr. R. Satheesh Raja, Head, Department of Marine Engineering, PSN College of Engineering and Technology (PSNCET) (see Figure 1A.1). Dr. V. Manikandan, Principal, PSNCET (see Figure 1A.2), emphasized that acquiring knowledge by faculty will improve the teaching-learning process.



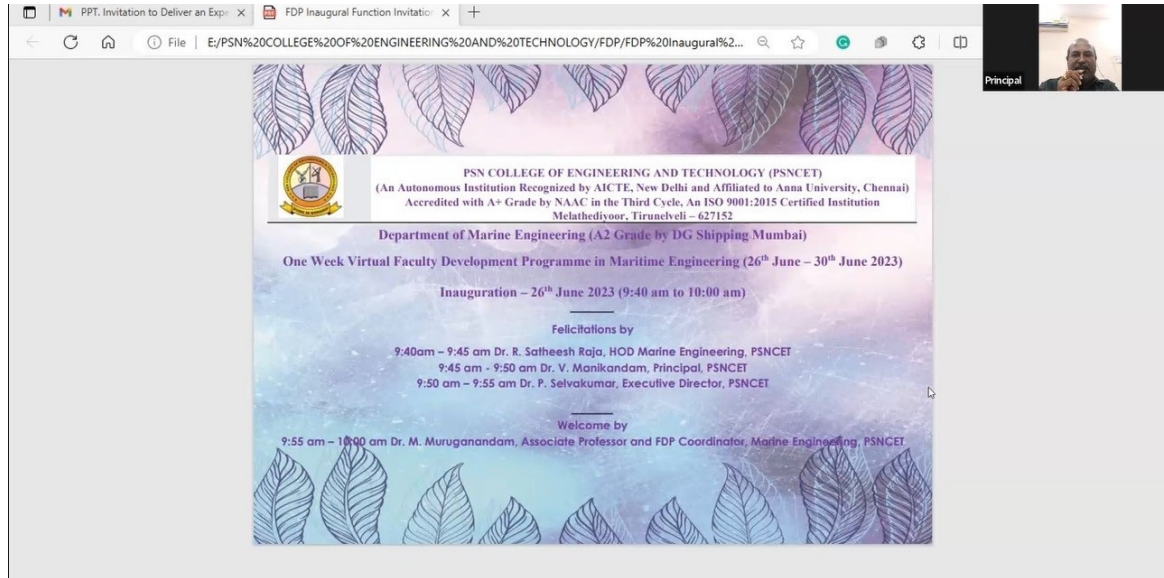
**Figure 1A.1 Felicitation Address by Dr. R. Satheesh Raja, Head, Department of Marine Engineering, PSNCET**

Dr. M. Muruganandam, Associate Professor and FDP Coordinator, Department of Marine Engineering, PSNCET (see Figure 1A.3), delivered the Welcome Address. He welcomed the participants from the various institutions in India. He highlighted the following objectives of the FDP on Maritime Engineering. This programme will (1) emphasize building and consolidating fundamental concepts and techniques required for designing, building, and testing ships and offshore structures for extreme conditions; (2) prepare the young faculty from engineering institutions with the necessary fundamental concepts and mathematical techniques required for teaching and research related to developing the skills that a student needs to become a naval architect and a marine engineer. Also, he

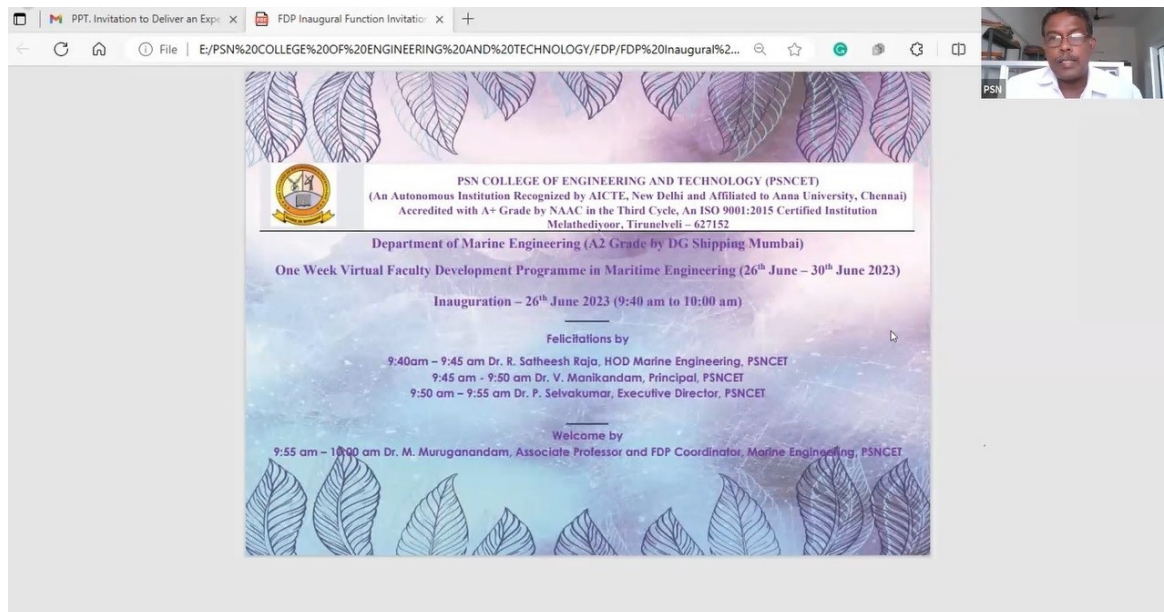


**Faculty Development Programme on Maritime Engineering  
Department of Marine Engineering  
PSN College of Engineering and Technology, Tirunelveli, 26<sup>th</sup> Jun.-02<sup>nd</sup> Jul. 2023**





**Figure 1A.2 Felicitation Address by Dr. V. Manikandam, Principal, PSNCET**



**Figure 1A.3 Welcome Address by Dr. M. Muruganandam, Associate Professor and FDP Coordinator, Department of Marine Engineering, PSNCET**

pointed out the following learning outcomes of FDP. The participants will be able to (1) analyze given physical problems related to ships and offshore structures and develop mathematical models; (2) predict the performance of ships and offshore structures; (3) demonstrate the skills required to become a naval architect and a marine engineer; (4) perform numerical simulations of ships and offshore structures, and interpret the solutions.





**Day 1**                      **26.06.2021, Monday**

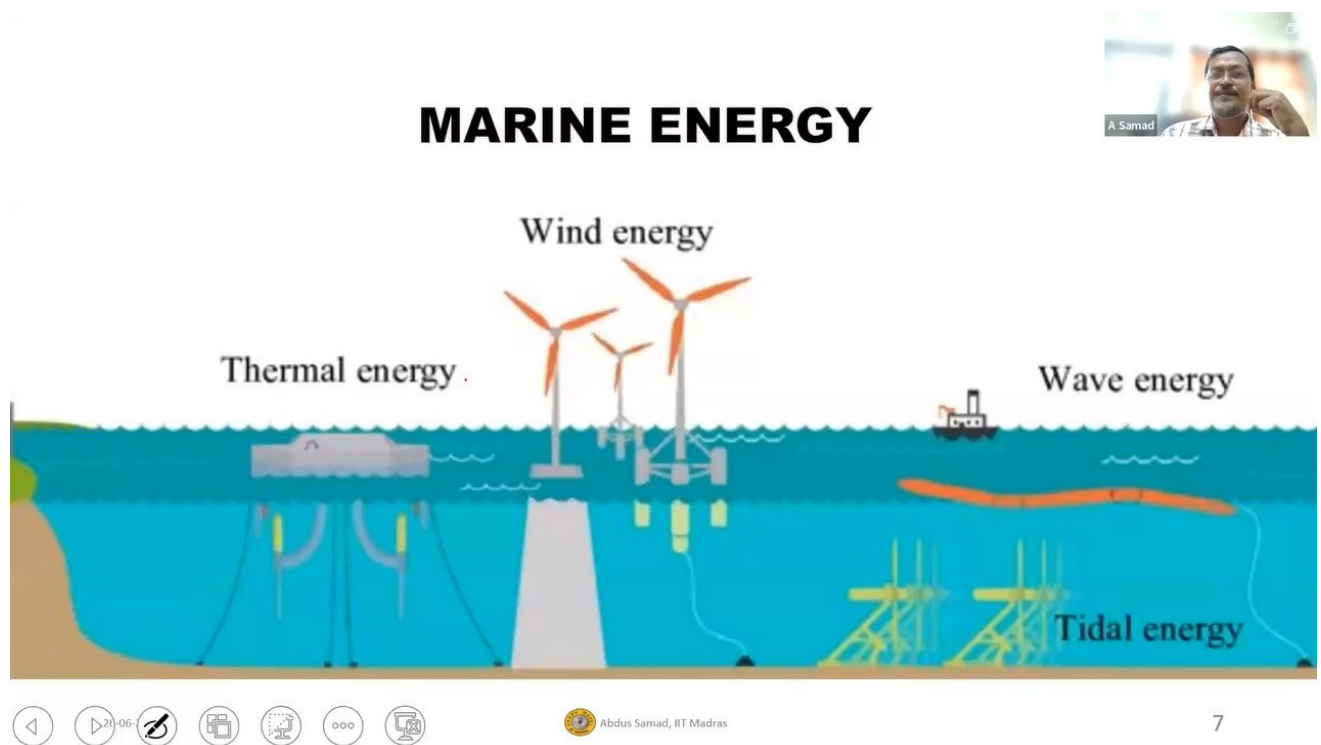
**Session 1B**            **10:00-12:00 Hrs.**

### ***Marine Energy***

**Dr. Abdus Samad**

Professor, Department of Ocean Engineering, Indian Institute of Technology (IIT) Madras, Chennai – 600 036.

Dr. Abdus Samad, Professor, Department of Ocean Engineering, IIT Madras, delivered an expert lecture on *Marine Energy*. He explained that 70% of the earth's surface is occupied by the ocean. By exploring various systems of ocean energy, the energy needs of every human being on the earth can be fulfilled, including the latest energy needs of electric vehicles. The following three systems of marine energy are found in the ocean, as shown in Figure 1B.1: (1) ocean thermal energy, (2) tidal energy, and (3) wave energy.

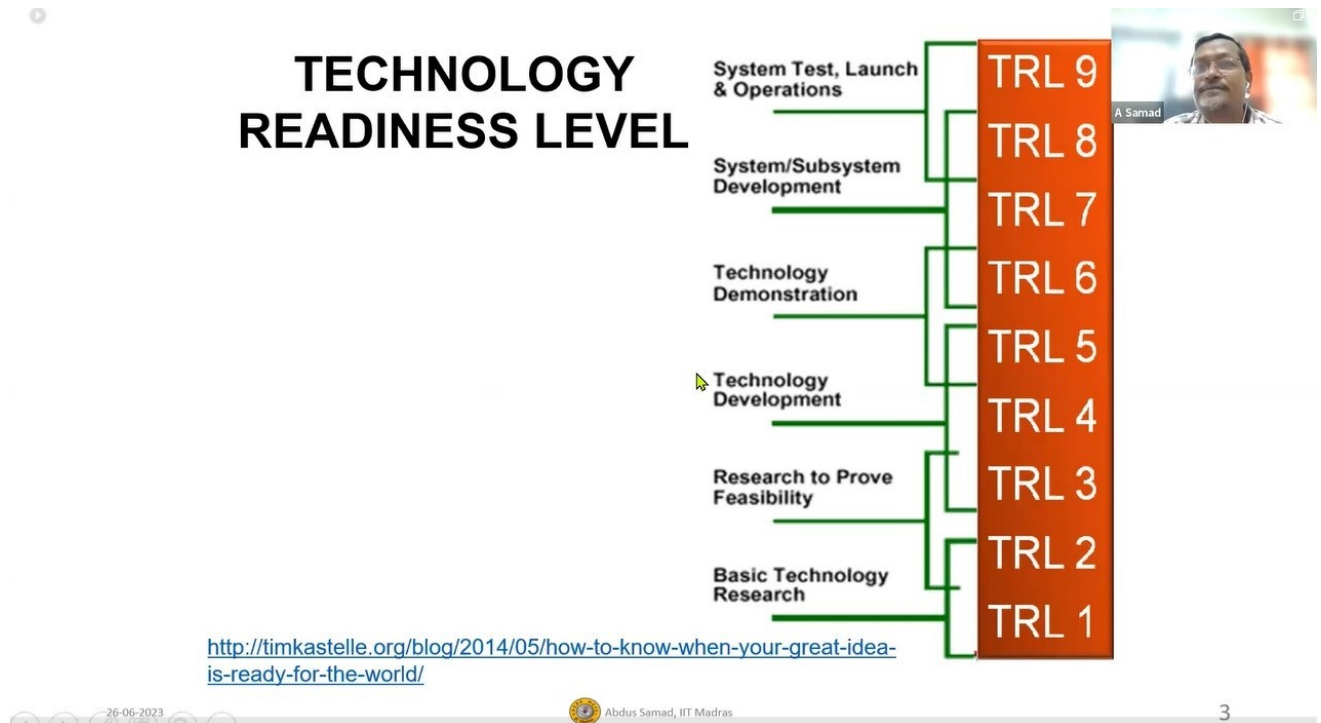


**Figure 1B.1 Various systems of marine energy**

Development of any technology takes place through a series of levels from TRL 1 to TRL 9 (see Figure 1B.2), where TRL stands for Technology Readiness Level. At TRL 1, technology is in a conceptual stage. By doing numerical calculations on that concept, one transcends to TRL 2. Laboratory experiments to validate the numerical calculations lead to TRL 3. Field trials of the concept place the technology at TRL 4. Finally, the technology is at TRL 9 when the product is launched, and



the product is used by the public. Most of the research efforts taken by academicians and scientists do not reach TRL 9 due to a lack of funding opportunities. Dr. Abdus Samad described this situation as a struggle for inventions to become innovations in the Darwinian Sea.



**Figure 1B.2 Technology Readiness Levels**

The standard of living in a country is dictated by the amount of energy used by every citizen of that country. As seen in Figure 1B.3, there is a negligible increase in the level of energy production in India, whereas there is a continuous and significant increase in the level of energy import in the form of coal and oil from other countries such as the USA, Russia, and the Middle East. If actions are taken to implement marine energy technologies, then the money spent on the import of energy can be utilized for various other basic development needs of our country, for example, education and health.

As per the policy report given by the International Energy Agency in 2006 (see Figure 1B.4), only wave energy itself can fulfill the energy needs of 7.8 billion people in the world today, which is expected to increase to 9.7 billion by 2050. Figure 1B.5 shows the global map of ocean thermal energy conversion potential (OTEC) - the temperature difference ( $\Delta T$ ) is shown between the ocean surface and the ocean bed. There is an average depth of 1000 m. It is seen that there is a  $\Delta T$  of 22°C to 24°C offshore of India. National Institute of Ocean Technology, Chennai, designed an OTEC plant that is operating on Agatti island (see Figure 1B.6, 7.6 km long island situated at 459 km west of Kochi) which is a part





- India- 4<sup>th</sup> largest consumer of crude oil and petroleum products (2015), after USA, China & Japan.
- Depends mostly on imported crude oil from Middle East.

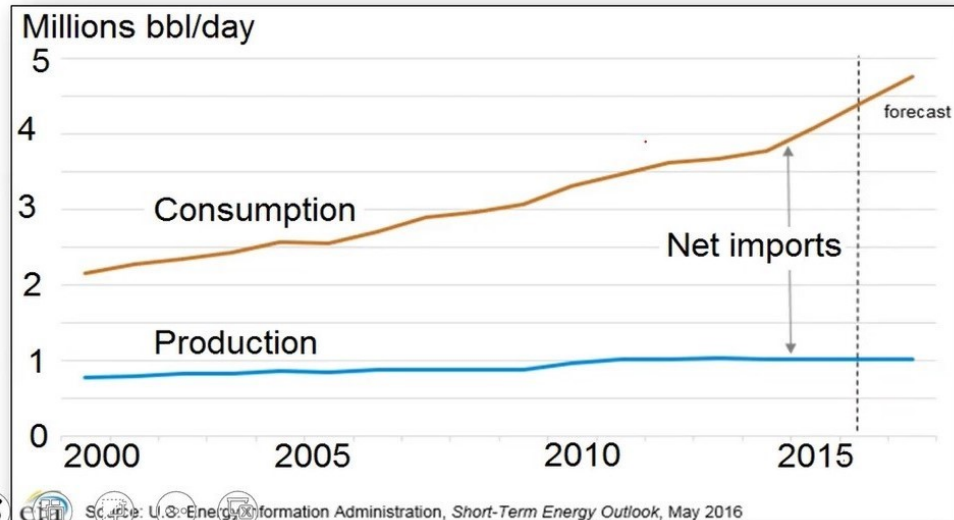


Figure 1B.3 Trend of energy production and energy import in India

## STATISTICS

Estimated Global Electricity Production from ocean sources	(TWh/year)
Tidal	0.3K
Tidal current	0.8K
Ocean wave	8K-80K
Salinity gradient	2K
Thermal energy	10K
<b>Total Oceanic Resources</b>	<b>~20K-90K</b>
<b>Total world electricity production from all sources</b>	<b>17.45K</b>

Table compiled from International Energy Agency, Policy Report, 2006

Abdus Samad, IIT Madras

Figure 1B.4 Global marine energy potential

of the Union Territory of Lakshadweep, India. Along the Indian coastal line, the wave energy potential is lower near Chennai than near Tuticorin, as shown in Figure 1B.7. Hence, a sea trial of the wave energy converter developed by IIT Madras has been done in the Indian coastal line near Tuticorin (see



Figure 1B.8). For further details, the reader is suggested to listen to the video recordings of Dr. Abdus Samad's lecture.

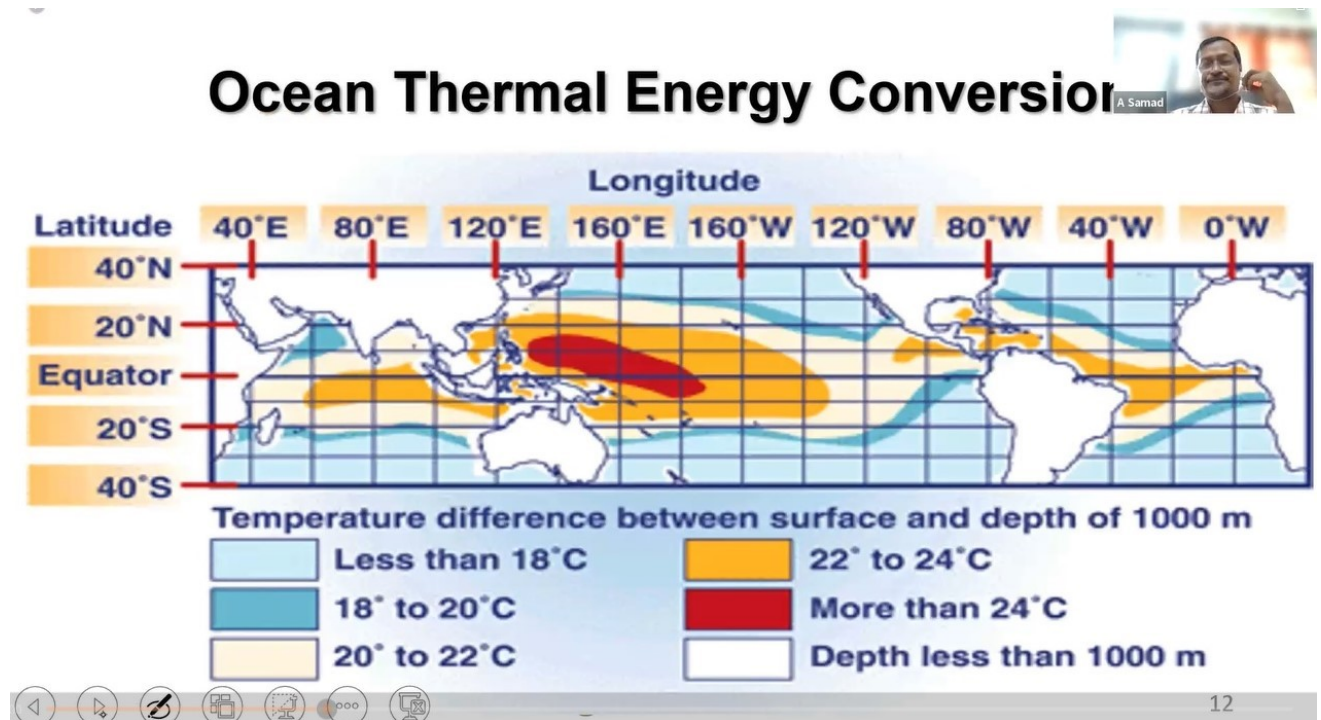


Figure 1B.5 Global ocean thermal energy potential

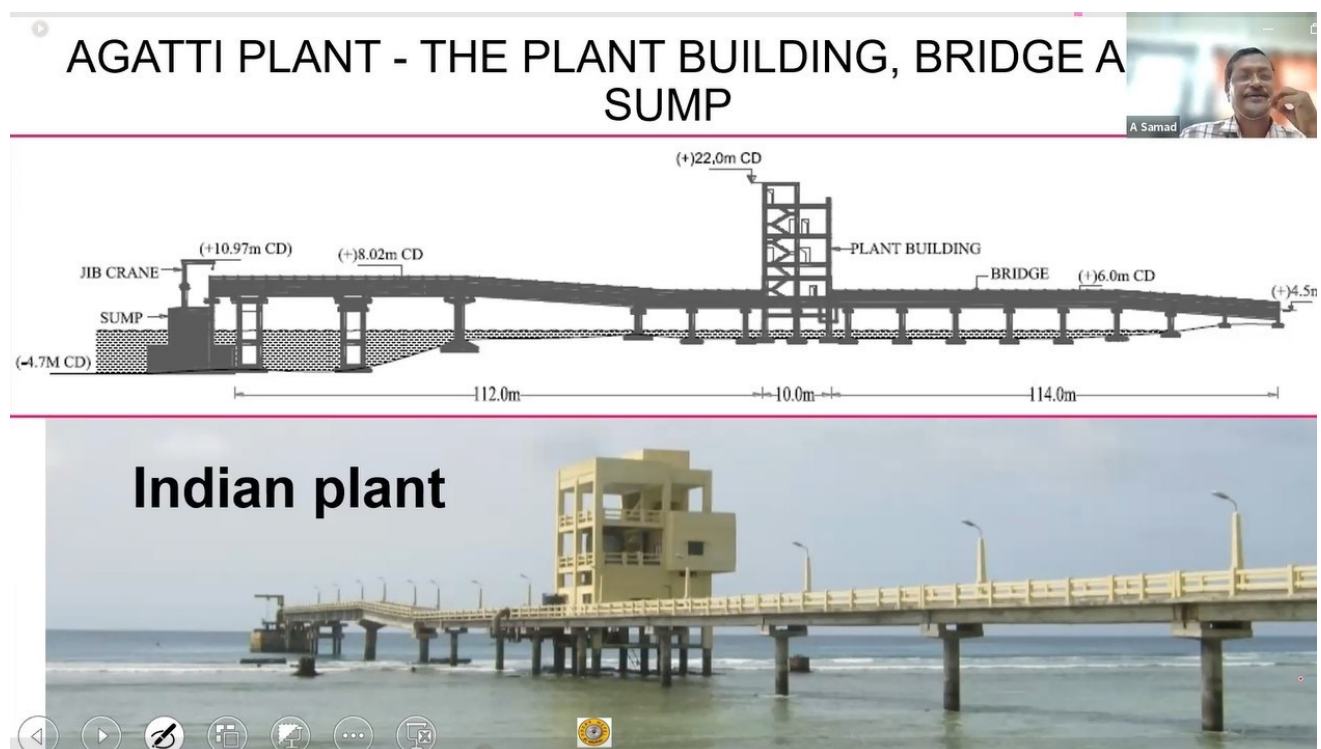
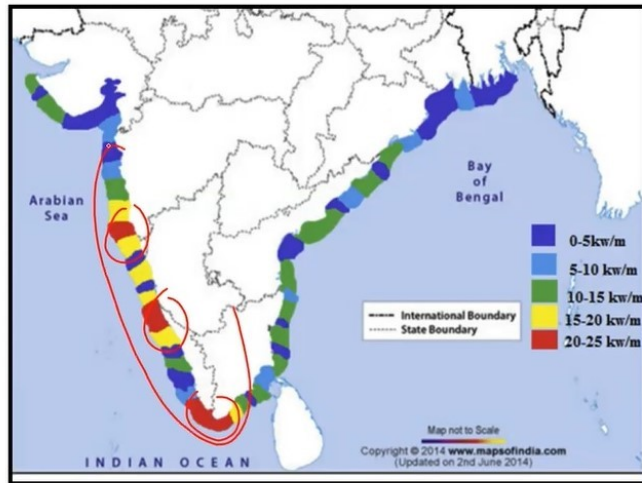


Figure 1B.6 Global ocean thermal energy potential





## WAVE POWER POTENTIAL ALONG THE INDIAN COASTLINE



Contour power level (kW/m)	Contour length (km)	Total power flux crossing contour (GW)
0-5	1530	3.825
5-10	822	6.165
10-15	1634	20.425
15-20	665	11.64
20-25	400	9

Study on Tidal and wave energy in India, Survey on potential and proposition of a roadmap. Final report by IREDA, AFD, and IIT, Madras

Figure 1B.7 Wave energy potential along the Indian coastal line



Our device- **SINDHUJA 1**

### Sea Trial



Video of sea trial

Figure 1B.8 Sea trial of wave energy converter developed by IIT Madras near Tuticorin



Day 1 26.06.2021, Monday

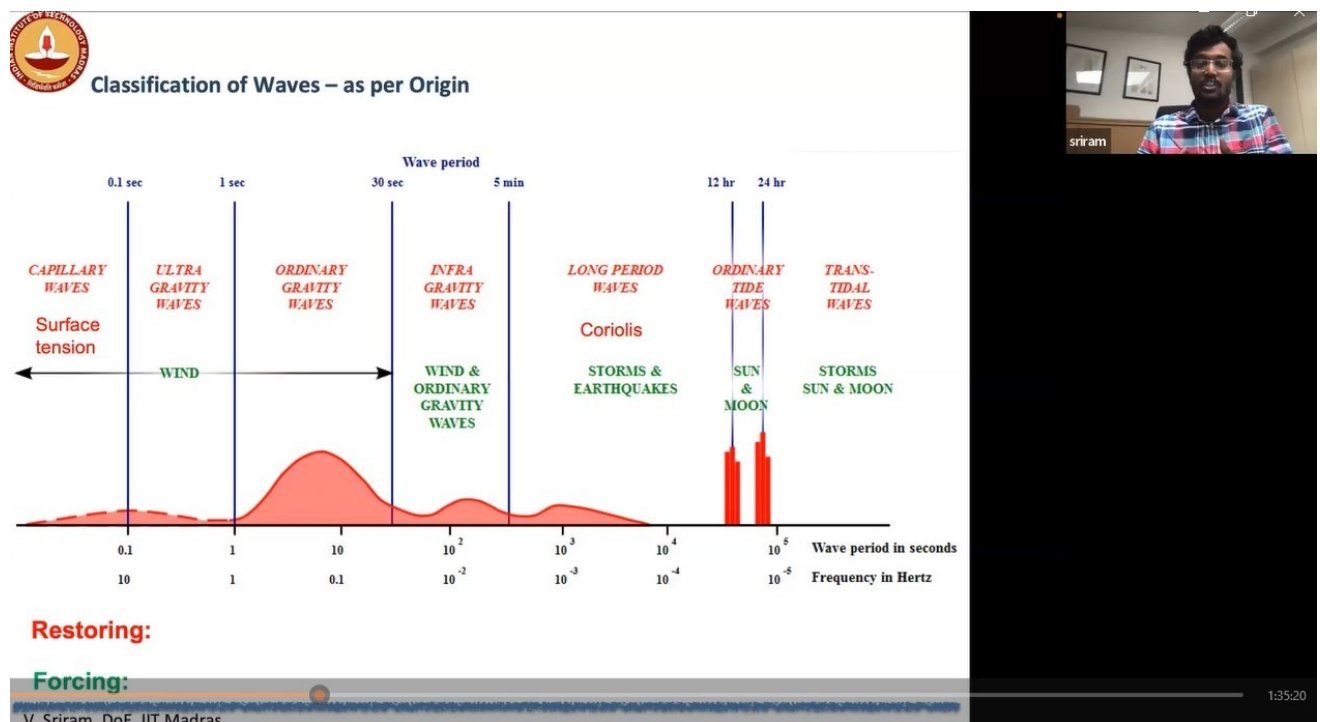
Session 2 14:00-16:00 Hrs.

***State of the Art in Numerical Modelling for Ocean Engineering***

**Dr. Sriram Venkatachalam**

Professor, Department of Ocean Engineering, Indian Institute of Technology (IIT) Madras, Chennai – 600 036.

Dr. Sriram Venkatachalam, Professor, Department of Ocean Engineering, IIT Madras, delivered an expert lecture on *State of the Art in Numerical Modelling for Ocean Engineering*. Based on the type of restoring force, the waves are classified as follows (see Figure 2.1): (1) capillary waves, (2) ultra gravity waves, (3) ordinary gravity waves, (4) infra gravity waves, (5) long period waves, (6) ordinary tide waves, and (7) trans tidal waves. Surface tension is the restoring force in capillary waves. Gravity force is the restoring force in cases (2), (3), and (4). Coriolis force caused by storms and earthquakes is the restoring force for long-period waves. Wave period is chosen for numerical modelling based on this classification.



**Figure 2.1 Classification of waves**

Figure 2.2 shows snapshots of a 15 m high breaking wave that interacts with an observatory platform for fourteen seconds. At 00:44:44 hrs., the height of waves around the structure is negligible. After a second, a huge wave strikes the structure and interacts with the structure for 10 seconds. Again,





the surroundings of the structure return to its original state with negligible wave heights. It is one of the challenges in numerical modelling of such complex physical phenomena in ocean engineering.



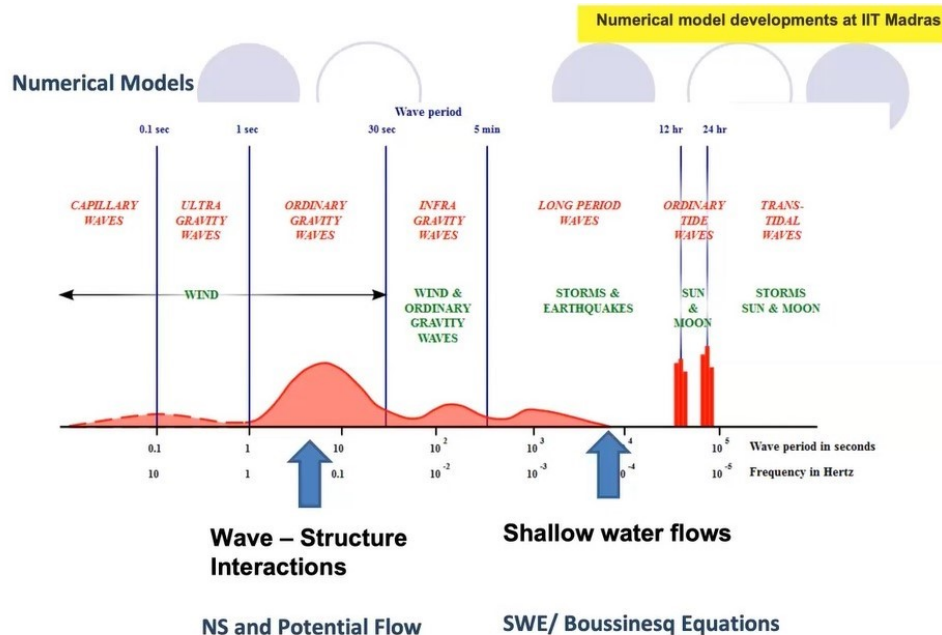
## Challenges



Snapshots of a 15 m high breaking wave captured at FINO 1 on 4<sup>th</sup> October 2009 (Source: Germanischer Lloyd, Hildebrandt & Sriram, 2014)

V. Sriram, DoE, IIT Madras

**Figure 2.2 Challenges in numerical modelling of a wave structure interaction in ocean**

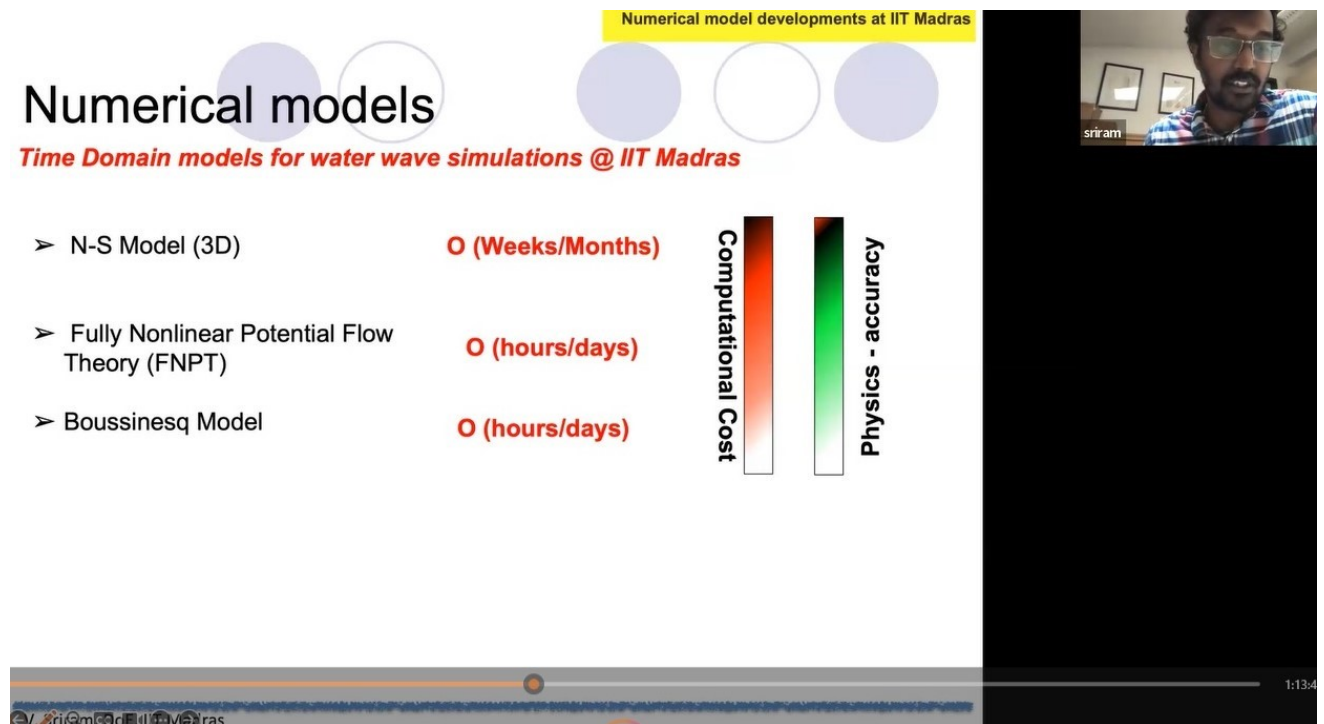


V. Sriram, DoE, IIT Madras

**Figure 2.3 Types of fluid flow governing equations in numerical modelling of a wave structure interaction in ocean**



As shown in Figure 2.3, for numerical modelling of wave structure interaction in the ocean, Navier-Stokes (N-S) fluid flow governing equations and fully nonlinear potential flow (FNP) equations are used. For numerical modelling of shallow water flows, Boussinesq equations are used. Among the three numerical models, such as the N-S flow model, FNP flow model, and Boussinesq flow model, the N-S model has the highest computation cost and accuracy. Among these three models, the Boussinesq model has the lowest computational cost and accuracy (see Figure 2.4).



**Figure 2.4 Comparisons of numerical models for water wave simulations based on computational cost and accuracy**

However, Dr. Sriram Venkatachalam has developed a mesh-free numerical method that is based on two-dimensional and three-dimensional Taylor series approximations over the last fifteen years (see Figure 2.5). This improved meshless local Petrov-Galerkin (IMLPG) numerical method has been applied to analyze the real field problems in ocean engineering by his team in collaboration with the City University of London. Figure 2.6 shows the numerical results on instantaneous wave heights and pressure measured by applying the IMLPG numerical method on a domain of a tank having 60 cm length, 30 cm height, and 12 cm height of water at initial conditions. These results satisfy the following operating conditions in the tank filled with water: amplitude of wave = 5 cm, exciting period = 1.5 s, and filling ratio = 40%. This numerical model predicts the impact pressure acting in a tank of a cargo vessel due to sloshing and wave topping. Figures 2.7 and 2.8 show the numerical results of a few more problems. For further information on this topic, the reader is suggested to listen to the recordings of





this session.

Numerical model developments at IIT Madras

## Improved Meshless Local Petrov-Galerkin

- Test and Trial Function
- Local sub-domain
- No mesh
- Algorithms for velocity and updating the coordinates

Our developments over past 15 years!! (IIT Madras and City, UoL)

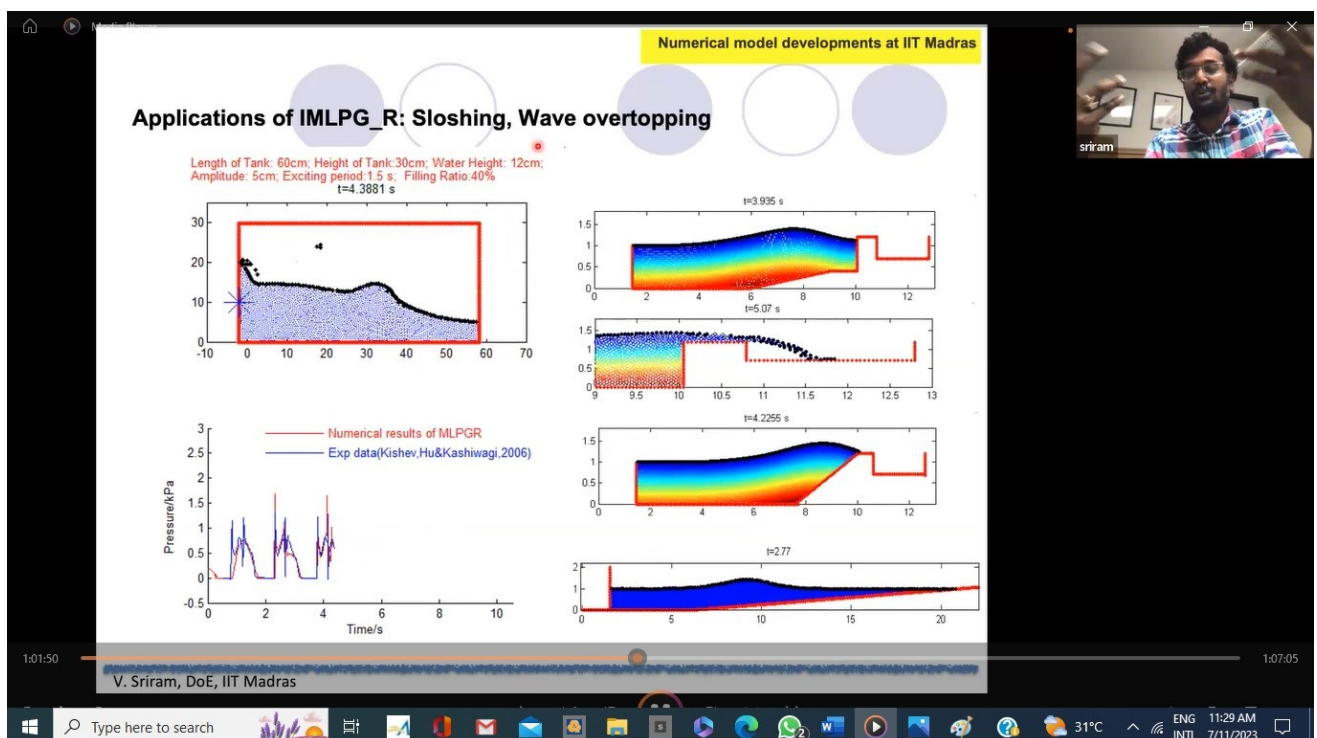
Applied Ocean Research  
Volume 116, November 2021, 102883

Review on the local weak form-based meshless method (MLPG): Developments and Applications in Ocean Engineering

V. Sriram<sup>1</sup>, Q.W. Ma<sup>2</sup>

V. Sriram, DoE, IIT Madras

**Figure 2.5 Improved meshless local Petrov-Galerkin (IMLPG) numerical method developed by IIT Madras and City University of London**

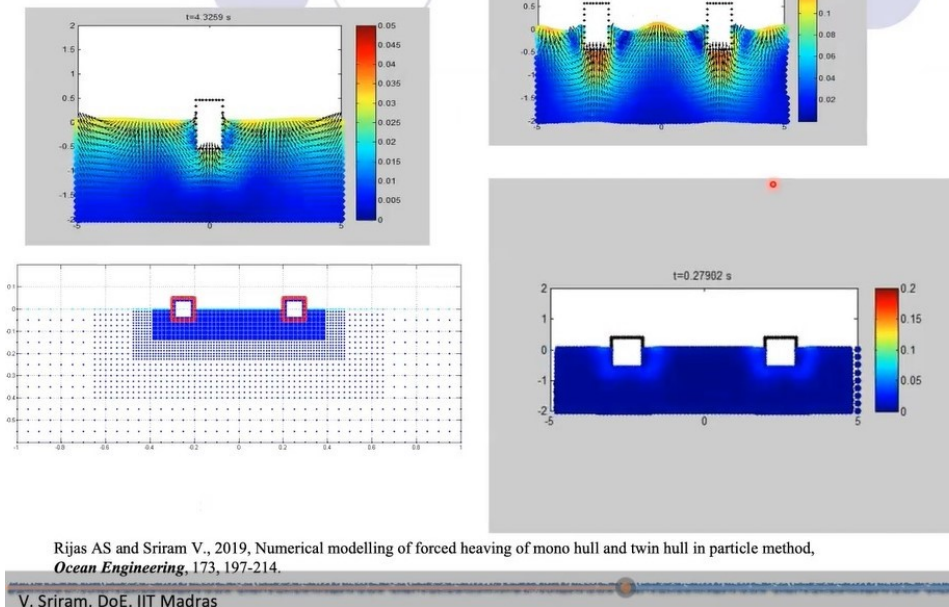


**Figure 2.6 Numerical results on instantaneous wave heights and pressure measured by applying the IMLPG numerical method on a domain of a tank having 60 cm length, 30 cm**

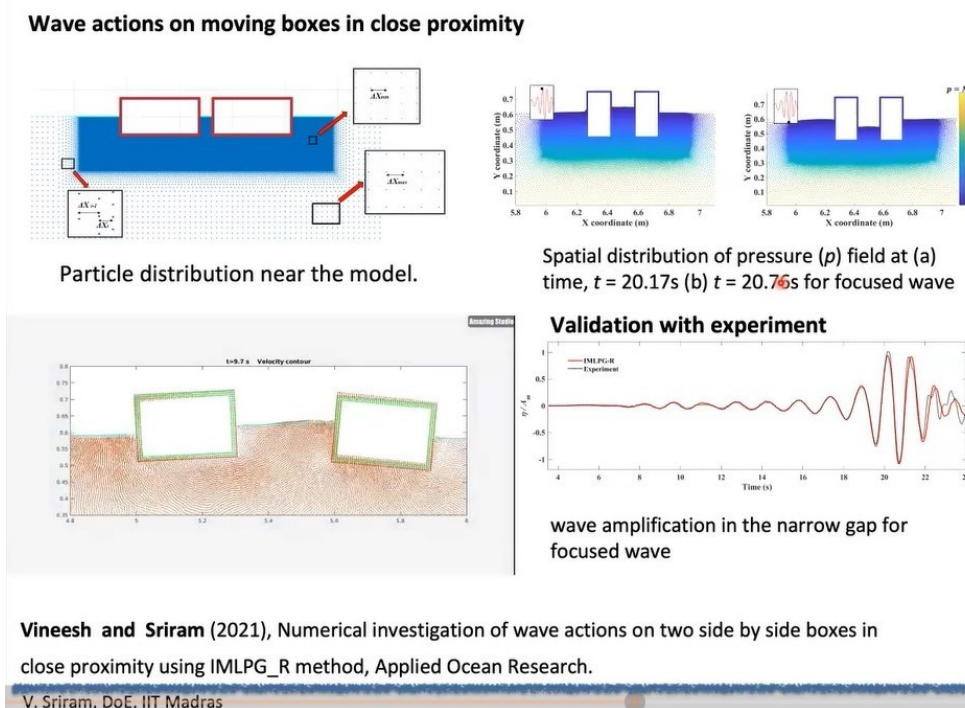


height, and 12 cm height of water at initial conditions and for the following operating conditions: amplitude of wave = 5 cm, exciting period = 1.5 s, and filling ratio = 40%.

## Modelling Floating bodies



**Figure 2.7 Numerical results on instantaneous wave heights and forced heaving of the mono hull and twin hull measured by applying IMLPG numerical method**



**Figure 2.8 Numerical results on wave action on two side-by-side boxes (for example, two vessels containing liquified natural gas nearby each other) by applying IMLPG numerical method**





**Day 2**                      **27.06.2021, Tuesday**

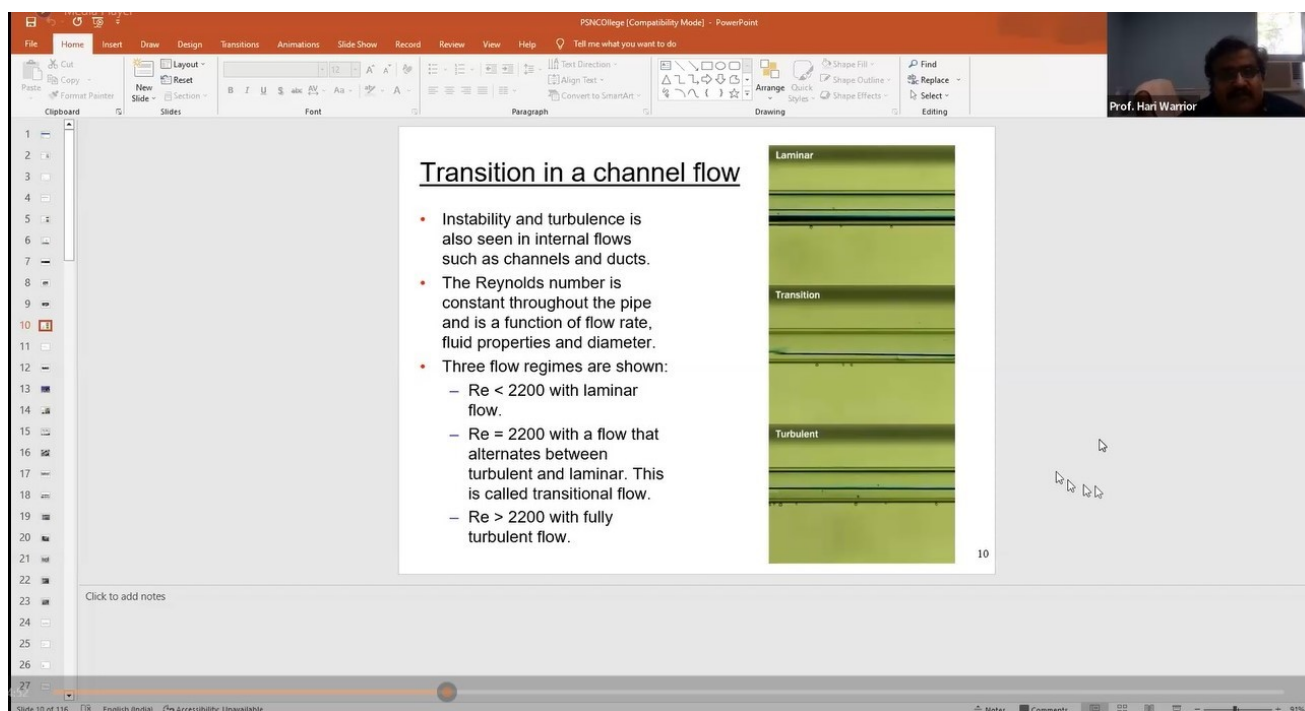
**Session 3**                **10:00-12:00 Hrs.**

### ***CFD Applications in Ocean Engineering***

**Dr. Hari V. Warrior**

Professor, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology (IIT) Kharagpur, Kharagpur – 721 302.

Dr. Hari V. Warrior, Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, delivered an expert lecture on *CFD Applications in Ocean Engineering*. He explained the physical conditions of turbulent flow (see Figures 3.1, 3.2, and 3.3) with reference to Reynolds number ( $Re$ ). Flow is in laminar conditions for  $Re < 2200$ . Flow becomes turbulent for  $Re > 2200$ . Flow is in a transition state (i.e., alternating laminar and turbulent flow conditions) at  $Re = 2200$ . Turbulent flow is an unsteady flow with aperiodic motion.

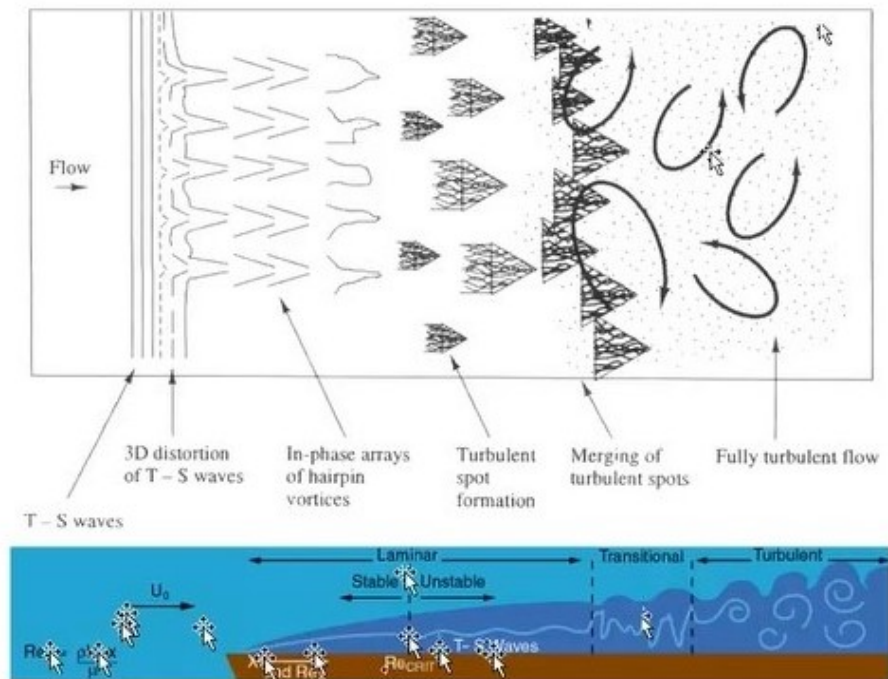


**Figure 3.1 Three regimes of fluid flow through a channel: laminar, transition, and turbulent regimes**

In a turbulent flow, the flow properties, such as velocity, pressure, and temperature, fluctuate with time (see Figure 3.4). The fluctuations in flow properties are due to the mixing of mass, momentum, and energy. The objective of turbulence modelling is to develop equations that will predict time-averaged velocity, pressure, and temperature. In computing the time-averaged properties, the time interval must be more than the scale of the slowest turbulent fluctuations. He explained about the



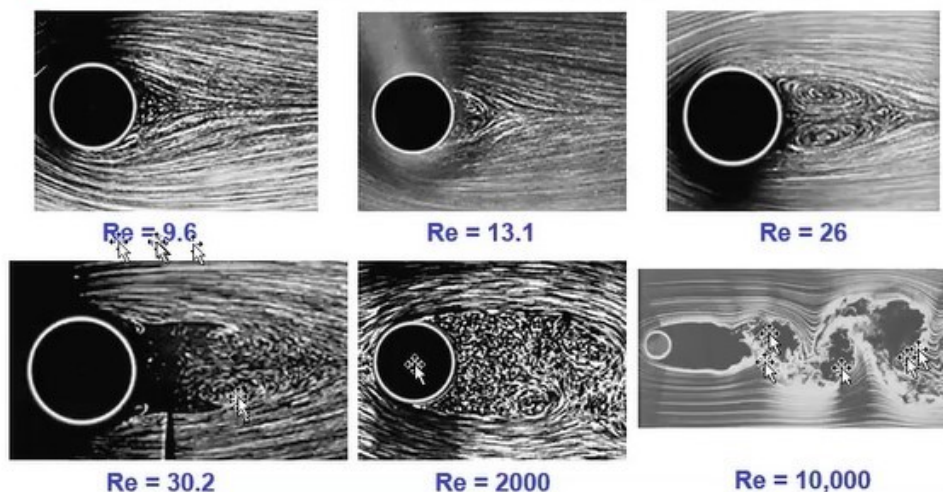
## Transition in boundary layer flow over flat plate



**Figure 3.2 Three regimes of fluid flow over a flat plate: laminar, transition, and turbulent regimes**

## Flow transitions around a cylinder

- For flow around a cylinder, the flow starts separating at  $Re = 5$ . For  $Re$  below 30, the flow is stable. Oscillations appear for higher  $Re$ .
- The separation point moves upstream, increasing drag up to  $Re = 2000$ .



**Figure 3.3 Three regimes of fluid flow over a cylinder: laminar, transition, and turbulent regimes**

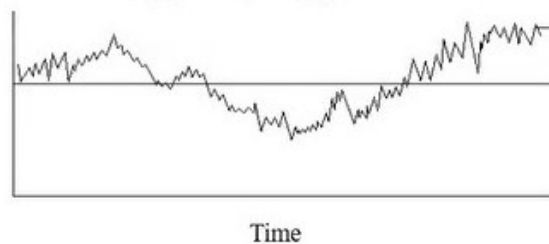


following Reynolds-averaged Navier-Stokes turbulence models: Boussinesq model, mixing length model (zero equation), Spalart-Almaras (one equation) model,  $k$ - $\varepsilon$  (two equations) model, and Reynolds stress (seven equations) model. In a  $k$ - $\varepsilon$  model,  $k$  represents the instantaneous kinetic energy per unit mass and  $\varepsilon$  represents the dissipation rate of  $k$ . Reynolds averaged Navier-Stokes equations (RANS) method of predicting turbulent flow requires the least computing power, whereas direct numerical simulation (DNS) requires the most computing power (see Figure 3.5). In DNS, large-scale eddies, as well as small-scale eddies, are taken into consideration, whereas in RANS, only large-scale eddies are considered.

### What is turbulence?

- Unsteady, aperiodic motion in which all three velocity components fluctuate, mixing matter, momentum, and energy.
- Decompose velocity into mean and fluctuating parts:

$$U_i(t) \equiv U_i + u_i(t).$$



- Similar fluctuations for pressure, temperature, and species concentration values.

4

**Figure 3.4 Turbulence in fluid flow**

Computational Fluid Dynamics (CFD) finds the following applications in Naval Architecture: (a) detection of ships from its wake characteristics, (b) reverse calculations of ships from its wake signature, (c) detection of Bernoulli hump and its magnitude for submarines, (d) determination of free surface features for submarines plying beneath, (e) reverse calculations on getting sub marine particulars, (f) machine learning as a tool for submarine detection, and (g) detection of torpedoes over seasons. By analyzing the Kelvin wake characteristics, the motion of ships and submarines can be studied during wide-area surveillance (see Figure 3.6). He explained the importance of the grid convergence test (see Figure 3.7).



## Prediction Methods

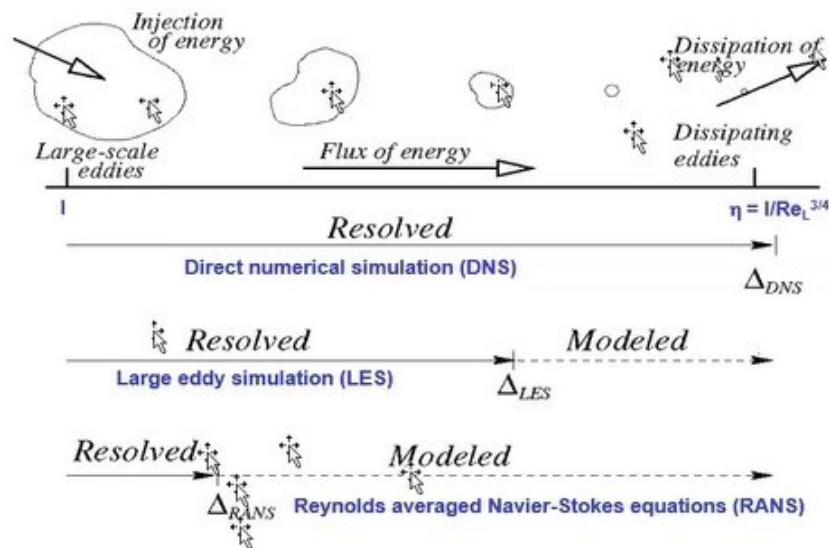


Figure 3.5 Turbulent flow prediction methods

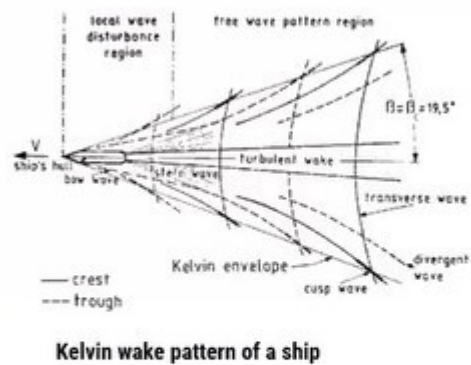
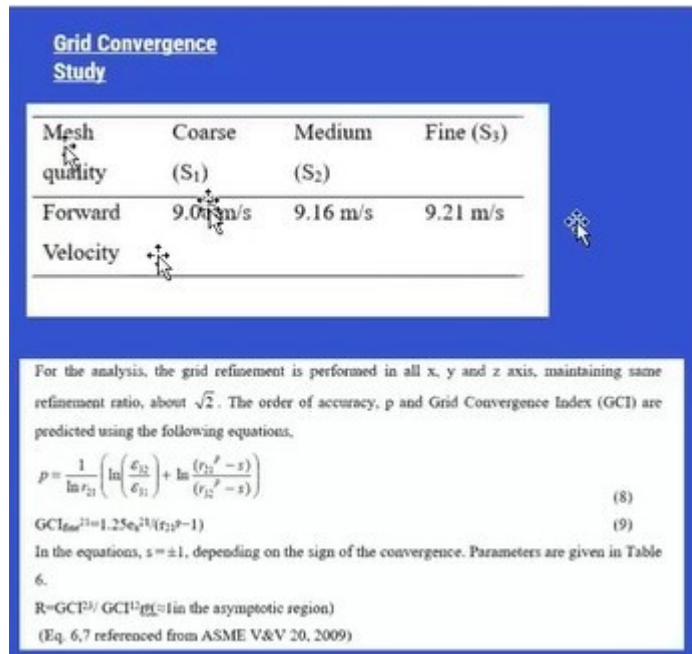


Figure 3.6 Wide area surveillance



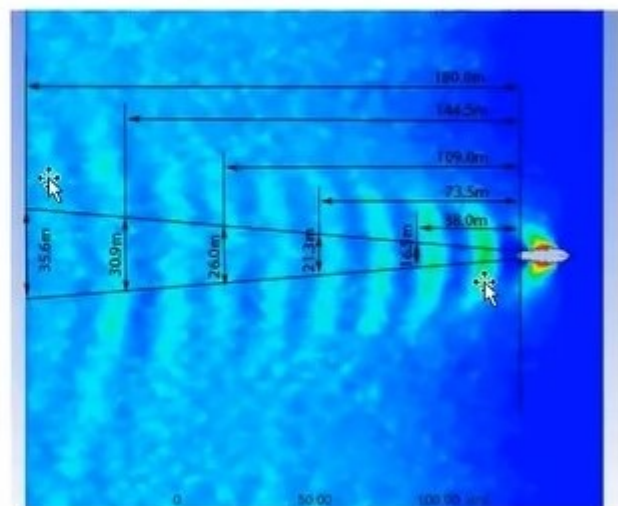


Item		Velocity (m/s)
		10
Refinement ratio	$r_{21} = h_2/h_1$	1.51
	$r_{32} = h_3/h_2$	1.50
Convergence	$\epsilon_{21}/\epsilon_{32}$	0.78
Order of P accuracy		0.31
Grid convergence index (GCI)	$GCI_{fine}^{21}$	0.012
	$GCI_{fine}^{32}$	0.010

**Figure 3.7 Grid convergence study in CFD analysis**

By studying the characteristics of wakes, the exterior dimensions of ships, submarines, and torpedoes can be estimated. During CFD simulation, by measuring the widths of wakes at various distances behind the ship, one can estimate the width of the ship (see Figure 3.8). For further details, the reader is suggested to listen to the recordings of this session.

Lpp and velocity	Beam error %
8m (vel=3.6m/s)	1.2
9m (vel=3.6m/s)	11.3
20m (vel=6m/s)	5.34
20m (vel=7.5m/s)	0.96
20m (vel=9m/s)	3.68
40m (vel=6m/s)	3.26
40m (vel=7m/s)	0.34
40m (vel=8m/s)	4.23
64m (vel=7.5m/s)	1.17
320m (vel=15m/s)	2.75
Mean Error % =	3.423



**Figure 3.8 Estimation of the width of a ship using CFD analysis**

**Day 3**                      **28.06.2021, Wednesday**

**Session 5**                **10:00-12:00 Hrs.**

### ***Marine Propulsion***

**Dr. Anirban Bhattacharyya**

Assistant Professor, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology (IIT) Kharagpur, Kharagpur – 721 302.

Dr. Anirban Bhattacharyya, Assistant Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, delivered an expert lecture on *Marine Propulsion*. In the field of naval architecture, the study of marine propulsion power calculations follows the study of ship resistance calculations. The contents of his lecture are about the following: (a) Introduction to marine propulsion, (b) Screw propeller geometry, (c) Propeller theories, (d) Propeller in open water, (e) Propeller behind ship hull, (f) Propulsion model tests, (g) Propeller design parameters, and (h) Different propulsor types. The propulsion system provides thrust for marine vessels to move at the desired speed. The most popular device used for marine propulsion is a screw propeller, as shown in Figure 5.1. Diesel engine is the most common machinery used for driving the propeller in ships.

## **SCREW PROPELLER**

**Screw  
Propeller**



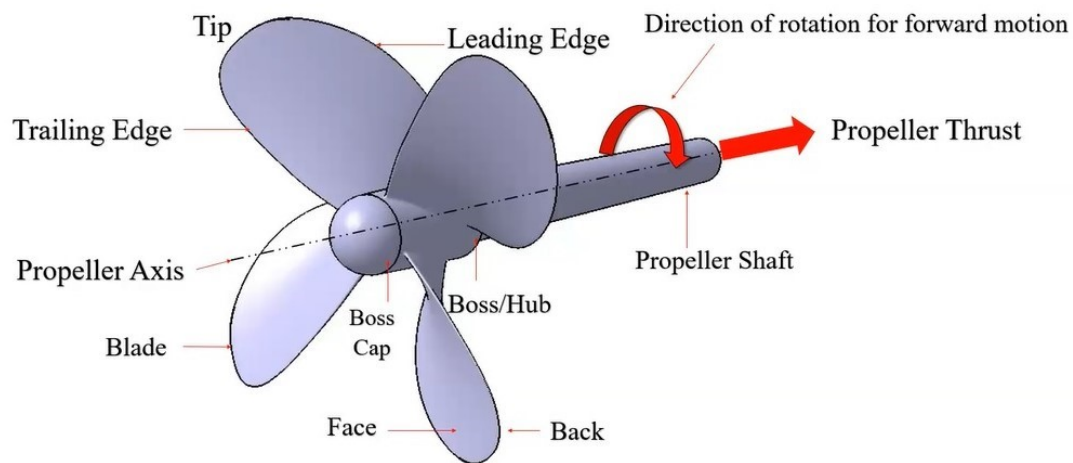
**Figure 5.1 Screw propeller**

Figure 5.2 shows (i) parts, (ii) the nomenclature of a blade, and (iii) the operating conditions of a screw propeller. The parts of a screw propeller are (a) the propeller shaft, (b) the boss or hub, (c) the blades, and (d) the boss cap. The nomenclature of a screw propeller blade consists of (1) propeller axis, (2) face, (3) back, (4) tip, (5) leading edge, and (6) trailing edge. Figure 5.3 shows the nomenclature of



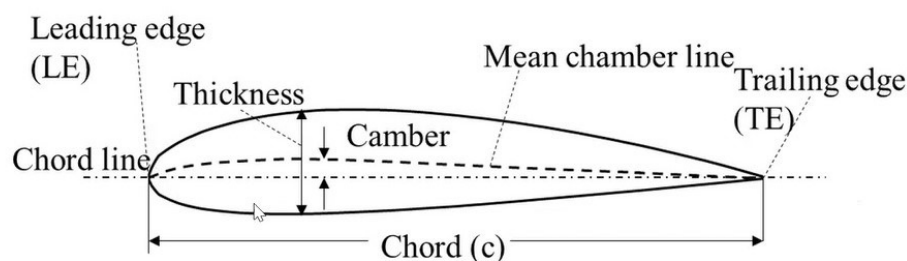
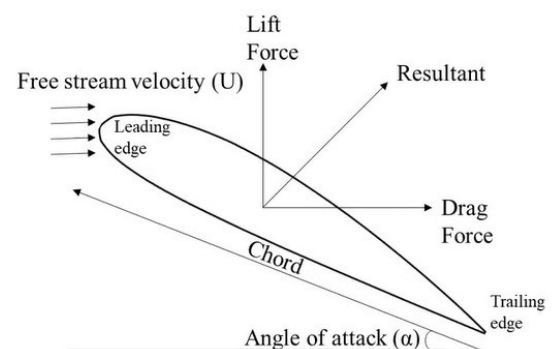


## Propeller Geometry



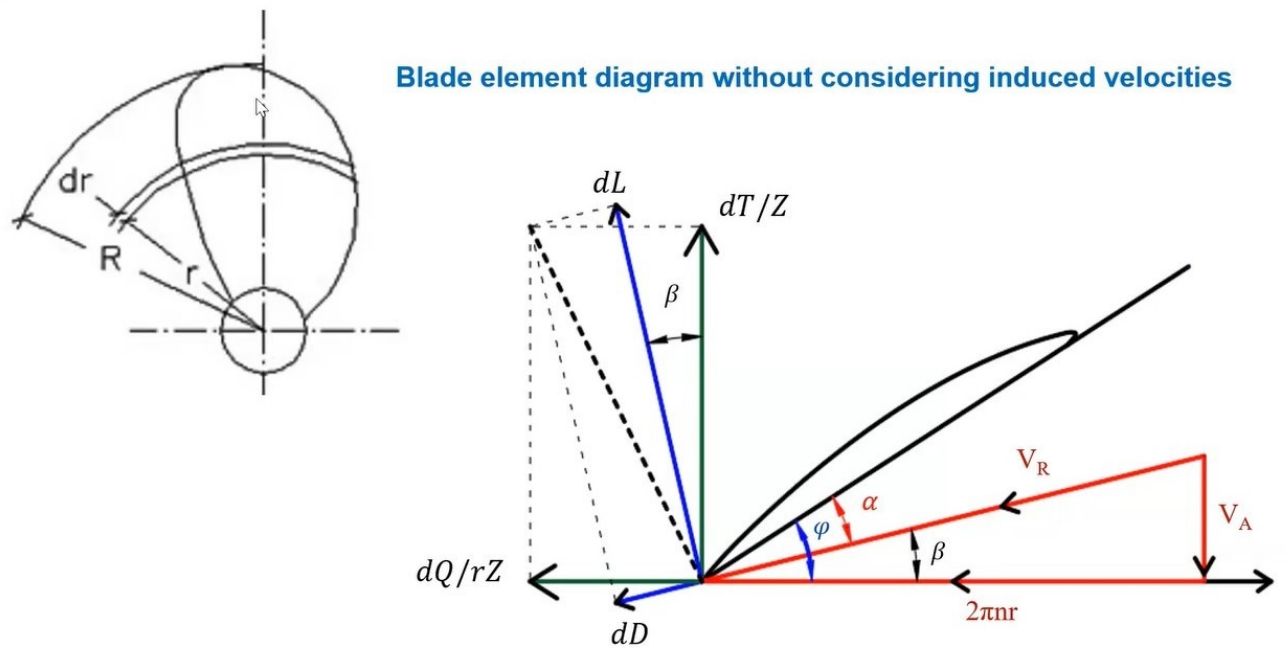
**Figure 5.2 Screw propeller geometry and operating conditions**

## Blade Section



**Figure 5.3 Nomenclature of a blade section of screw propeller geometry**

a blade section of a screw propeller geometry where the following geometrical parameters can be identified: chord length of blade section,  $c$ , blade thickness distribution along the chord, and camber. A propeller is regarded as an actuator disc imparting sudden pressure increase to the fluid. The propeller produces thrust by inducing axial velocity uniformly over the disc without rotation of the slipstream. The propeller blade is regarded as a series of blade elements, each producing hydrodynamic forces



**Figure 5.4 Screw propeller blade velocity and force diagrams**

based on inflow conditions. The thrust of the propeller is obtained by the integration of elemental thrust at different radii (see Figure 5.4) for all blades. The following methods are used to compute the thrust of the propeller: lifting line and lifting surface methods, panel methods, and computational fluid dynamics approaches. Figure 5.4 shows the components of velocity and force for a blade section at a radius  $r$  from the propeller axis where propeller tip radius =  $R$ . In the velocity diagram,  $V_A$  = forward velocity,  $2\pi nr = V_T$  = tangential velocity,  $V_R$  = resultant velocity,  $n$  = rotational speed of propeller in revolutions per second,  $\beta$  = hydrodynamic inflow angle and  $\phi$  = pitch angle. The angle of attack  $\alpha$  of a blade section, at a radial location  $r$  from the propeller axis, is determined from  $\beta$  and  $\phi$ , using velocity diagram. In the force diagram,  $dD$  = elemental drag,  $dL$  = elemental lift,  $dT$  = elemental thrust,  $dQ$  = elemental torque, and  $Z$  = number of blades.  $dT$  and  $dQ$  of a blade section, at a radial location  $r$  from the propeller axis, is determined from  $dL$ ,  $dD$ ,  $\alpha$  and  $\beta$ , using force diagram.

Design of a propeller involves determining the geometry of the propeller (i.e.,  $c$ , blade thickness distribution along the chord, camber,  $\phi$ ,  $R$ , propeller hub radius,  $Z$ , etc.) for a set of given operating conditions such as velocity/circulation distribution. Analysis of a given propeller (i.e., the geometry of the propeller is known) involves determining the velocity and the pressure distributions. Using the velocity and the pressure distributions, the thrust and the torque characteristics can be arrived at.

Due to the very large size of ships, it is not possible to carry out full-scale experiments. Hence,



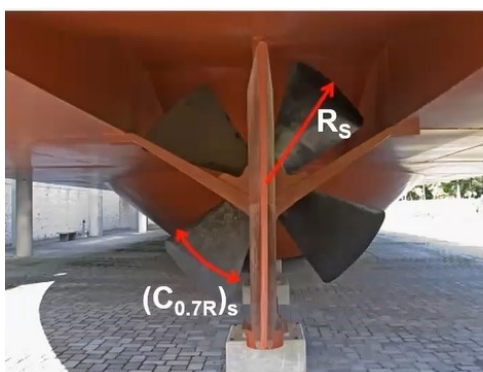


in naval architecture, ship model testing is done. i.e., The size of the ship is to be scaled down to make a model of the ship and the testing is done on this model. The model test results are extrapolated to estimate the performance of the full-scale ship. The size of a model is chosen based on the accessible testing facilities. The larger the size of the model chosen, the smaller will be the level of uncertainties when extrapolating the model test results to the full-scale ship. To get comparable results from full-scale ships, certain conditions are required to be satisfied. These conditions are known as laws of similarity. The following laws of similarity need to be satisfied for a model to be a better representation of the full-scale ship: geometric similarity, kinematic similarity, and dynamic similarity. For example, the geometric similarity is satisfied when  $L_M / L_S = W_M / W_S = D_M / D_S$ , where  $L$  = length,  $W$  = width,  $D$  = depth,  $M$  represents the model and  $S$  represents the ship (see Figure 5.5 for another example of geometric similarity). Similarly, when the ratios of velocity components of the model and ship are equal then the kinematic similarity is satisfied. From Figures 5.4 and 5.6, it is inferred that  $\beta_M = \beta_S$  when kinematic similarity is satisfied with  $V_{A,M} / V_{A,S} = V_{T,M} / V_{T,S}$ . i.e., The advance coefficient of the ship and the advance coefficient of the model are the same. The advance coefficient of the ship is considered to be an important performance parameter. When the ratio of force components of the model and ship are equal then the dynamic similarity is satisfied.

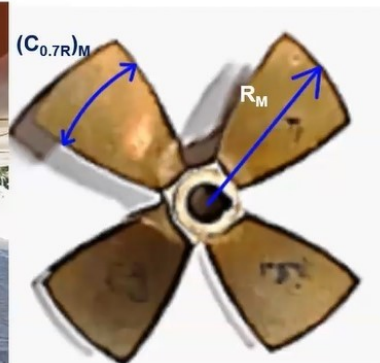
Using the open water characteristics of a propeller, the thrust of the propeller at the bollard pull condition or any other operating condition can be determined. The performance of a propeller when it is installed behind the ship will be affected by the following factors. 1. Due to the wake generated by

## Laws of Similarity

### Geometric Similarity



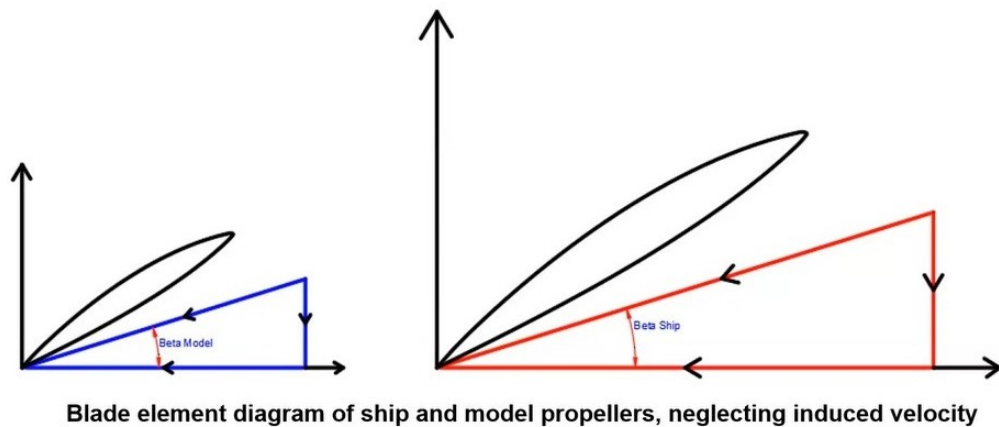
**Ka-series Propeller**  
(Source: Wikimedia Commons)



**Ka-series Propeller Model.**

$$\frac{D_S}{D_M} = \frac{(C_{0.7R})_S}{(C_{0.7R})_M} = \text{Scale Ratio}(\lambda)$$

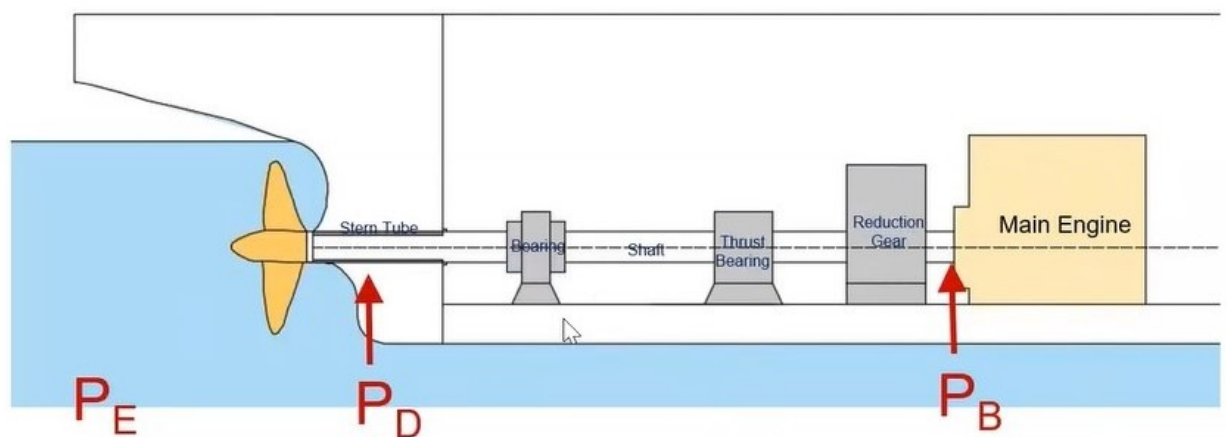
**Figure 5.5 Geometric similarity between a propeller model and a ship propeller**



**Figure 5.6 Kinematic similarity between a model propeller blade section and a blade section of a ship propeller**

a ship, the inflow velocity into the propeller will be different compared to the ship speed. 2. Due to the propeller action, the water is accelerated at the stern. As a result, the resistance gets augmented and is now more compared to the bare hull resistance. The efficiency of a propeller working in uniform inflow (no ship or open water) and non-uniform inflows (behind a ship) are different.

An engine drives the propeller. A thrust bearing as shown in Figure 5.7 transmits the thrust from the propeller to the ship. A reduction gear is required when the speed of the engine differs from the speed of the propeller. In Figure 5.7,  $P_B$  = brake power of the engine,  $P_D$  = power delivered to the propeller, and  $P_E$  = effective power of the ship. For additional details, the reader is suggested to listen to the recordings of this session.



**Figure 5.7 Power transmission from the engine to the propeller of a ship**



**Day 3**                      **28.06.2021, Wednesday**

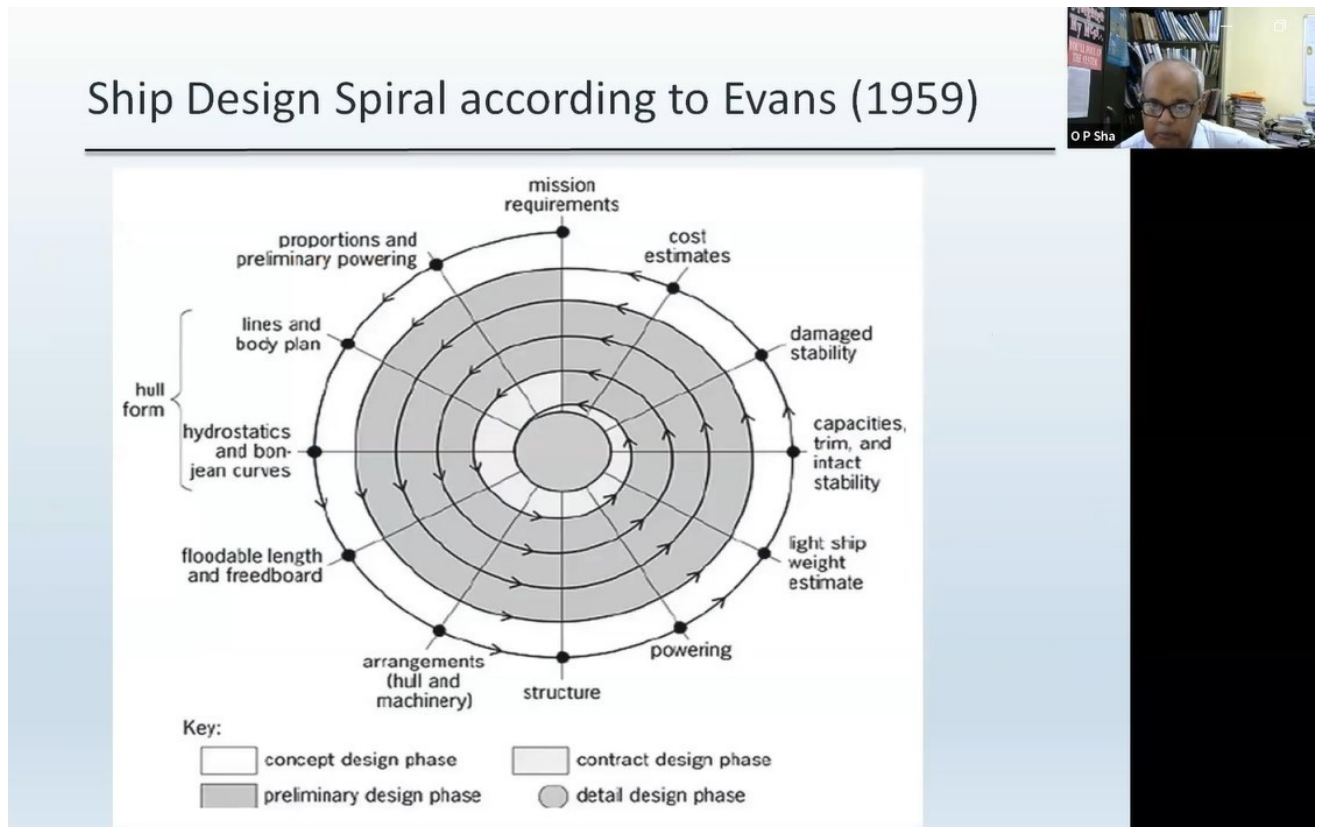
**Session 6**                **14:00-16:00 Hrs.**

***Optimize Ship Performance through Integrated Simulation***

**Dr. Om Prakash Sha**

Professor, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology (IIT) Kharagpur, Kharagpur – 721 302.

Dr. Om Prakash Sha, Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, delivered an expert lecture on *Optimize Ship Performance through Integrated Simulation*. The contents of his lecture are an introduction, concept design, resistance and hull form, associative geometric modelling techniques, parametric modelling using CAESES®, case study 1 – fully parametric model – fast hull form design, case study 2 – partial parametric model – asymmetric stern design, case study 3 – bulbous bow optimization, case study 4 – bow form design, and conclusions.



**Figure 6.1 Ship design spiral**

In the past, the design of a ship was dependent on intuitive reasoning from previous knowledge and experience of a naval architect. The design process was carried out through iterative trials and errors. Design optimization was done by selecting the best design out of a few feasible solutions. This



design process was illustrated as a ship design spiral (see Figure 6.1).

Since (i) there is an ever-changing nature of seaborne trade, (ii) a naval architect needs to adapt to new safety regulations laid down by Indian Maritime Organization (IMO), and (iii) a naval architect needs to adapt to increased energy awareness such as energy efficiency design index (EEDI), there is a need for holistic, efficient, and easy to use ship design procedures and software systems. Figure 6.2 shows the measures taken by IMO towards increasing energy efficiency and decreasing greenhouse gas emissions. See Figure 6.3 to know more details about EEDI. During the conceptual design phase, the following activities take place: computer-aided engineering (CAE), computer-aided design (CAD), computational fluid dynamics (CFD), and optimization. During the concept design stage, the main dimensions of a ship (see Figure 6.4) such as beam, length, and draft are arrived at. These dimensions should satisfy the conflicting design optimization requirements of a maximum capacity of cargo, minimum weight of the ship, maximum speed of the ship, and minimum installed power in the ship. Figure 6.5 shows the activities in the concept design phase of modern naval architecture.

## Energy Efficiency Measures -IMO Strategy on Reduction of GHG emissions from ships

**Energy Efficiency Design Index (EEDI)** – new designs to meet reference level of their ship type

- Aims at promoting efficient (less polluting) equipment and engines
- Requires minimum energy efficiency level per tonne-mile


**Energy Efficiency Existing Ship Index (EEXI)** –to reduce GHG emission by 40% (2030) 50% (2050)

- To apply to all vessels > 400GT from 2023
- Required EEXI  $\approx$  EEDI for new ships as of 2023
- Ships rated on a scale of A to E based on annual operational carbon intensity indicator (CII)

EEXI requirements will start from **1<sup>st</sup> January 2023**

**Ship Energy Efficiency Management Plan (SEEMP)** – an operational measure

- Establish a mechanism to improve the energy efficiency of the ship in cost-effective manner
- Uses a monitoring tool called Energy Efficiency Operational Indicator (EEOI)



O.P. Sha

**Figure 6.2 Measures taken by IMO to increase energy efficiency and reduce GHG**





## Energy Efficiency Design Index - EEDI

### Energy Efficiency Existing Ship Index (EEXI)

$$\text{EEXI [g/ton} \cdot \text{mile]} = \frac{\text{CO}_2 \text{ Conversion factor} \times \text{SFC [g/kW} \cdot \text{h]} \times \text{Engine Power [kW]}}{\text{Capacity [ton]} \times \text{EEXI Speed [knots]}}$$

CO<sub>2</sub> emissions (gram) from a ship when ship sail transport 1 (ton) cargo for 1 (nautical mile)

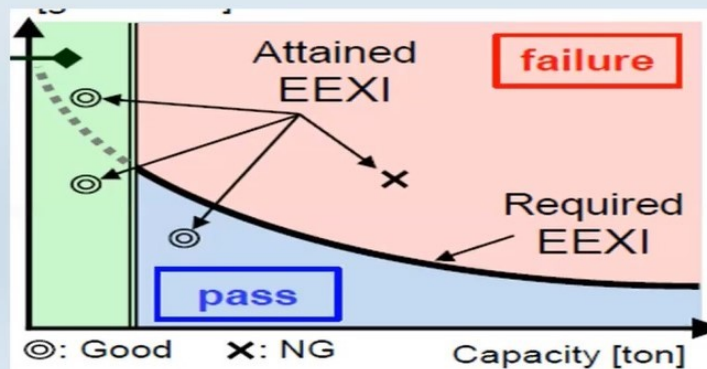


Figure 6.3 Concept design phase at modern Naval architecture

## Concept Design Stage – Reasonably complex?

Inherent to ship design optimisation are the **conflicting requirements** resulting from the **design constraints** and **optimisation criteria**

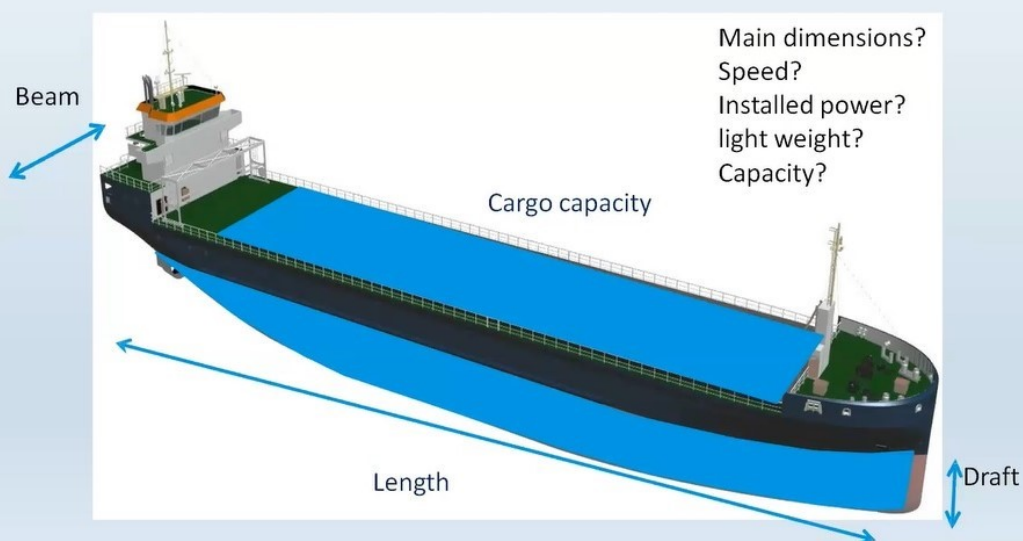
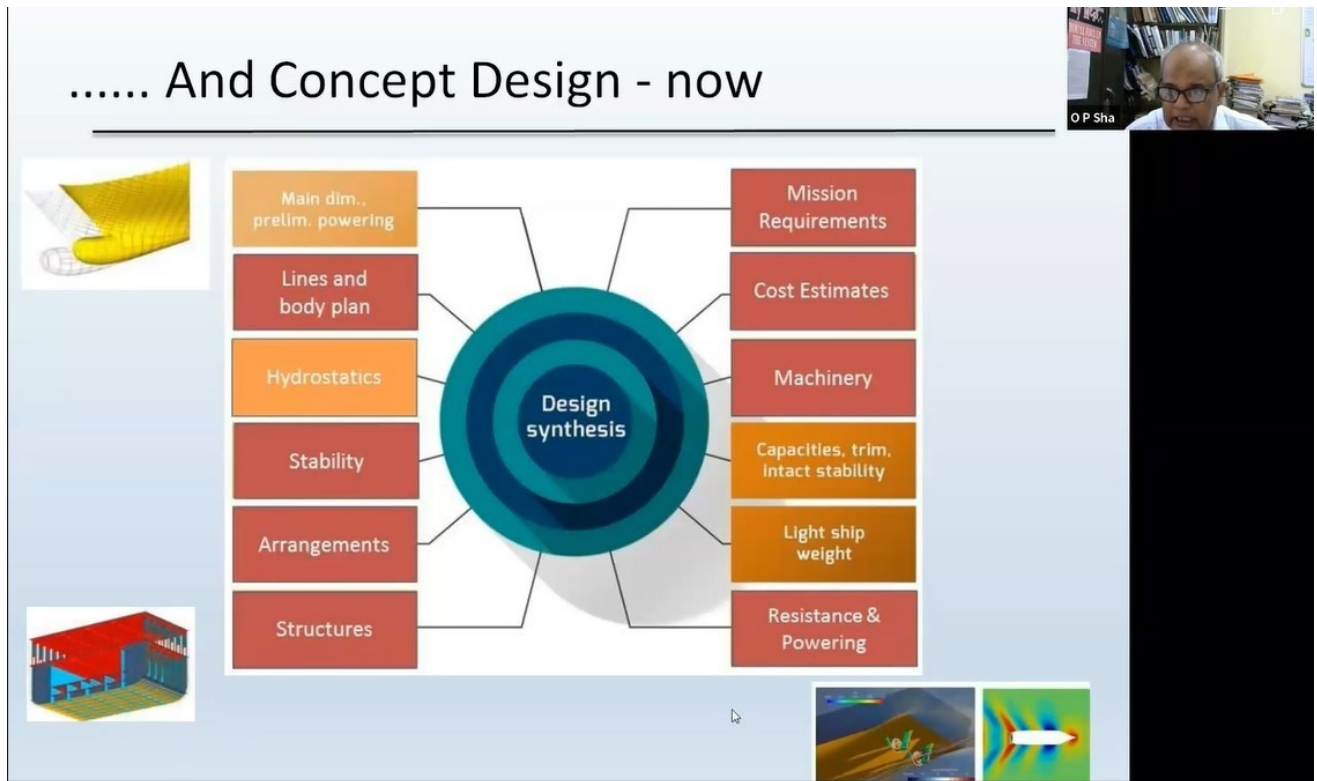


Figure 6.4 Concept design phase



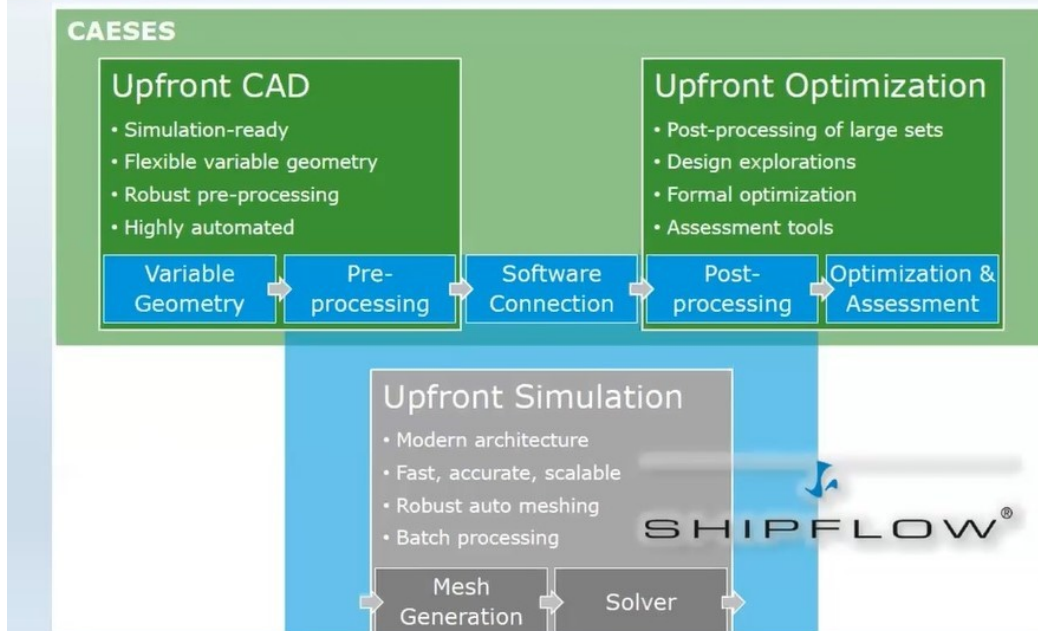


**Figure 6.5 Concept design phase in modern naval architecture**

In building a new ship, the hull form development must be considered carefully at the design stage. The hull form is set to minimize resistance / delivered power within the limits set by the ship's intended operation. Wave-making resistance is a more important parameter where the ship has a high speed-length ratio (Froude number). Therefore, the smaller and faster a ship is, the more critical the hull design is to achieve fuel savings. In addition to optimizing hull form, the hull-propeller-rudder interaction should also be examined and the propeller wake field optimized. i.e., The selection of the propeller and development of the hull shape should be done simultaneously. Associative geometric modelling ensures that when some elements in the model are changed, the generative relationship updates the related elements. In ship design, the potential of gaining a benefit by changing the hull form is highest when undertaken early in the process at the concept design stage. One of the types of associative geometric modelling is parametric modelling. In fully-parametric modeling, the entire shape is defined using parameters. In a partially-parametric modeling, an initial shape is taken and changes are defined by parameters that then modify the initial shape. For further details regarding fully parametric modelling using Computer Aided Engineering System Empowering Simulation (CAESES, see Figures 6.6 and 6.7), the reader is suggested to listen to the recordings of this session.

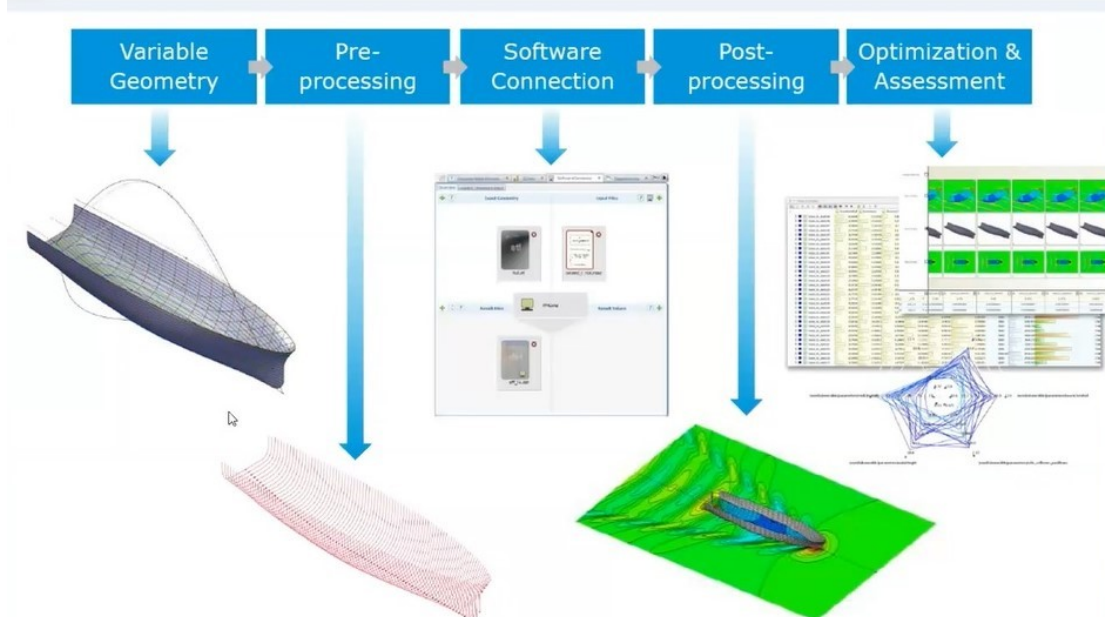


# Upfront CAE System Empowering Simulation



**Figure 6.6 Computer-Aided Engineering System Empowering Simulation (CAESES)**

## Process Workflow: Setting up the Automation Chain



**Figure 6.7 Process workflow in CAESES**



**Day 4**                      **29.06.2021, Thursday**

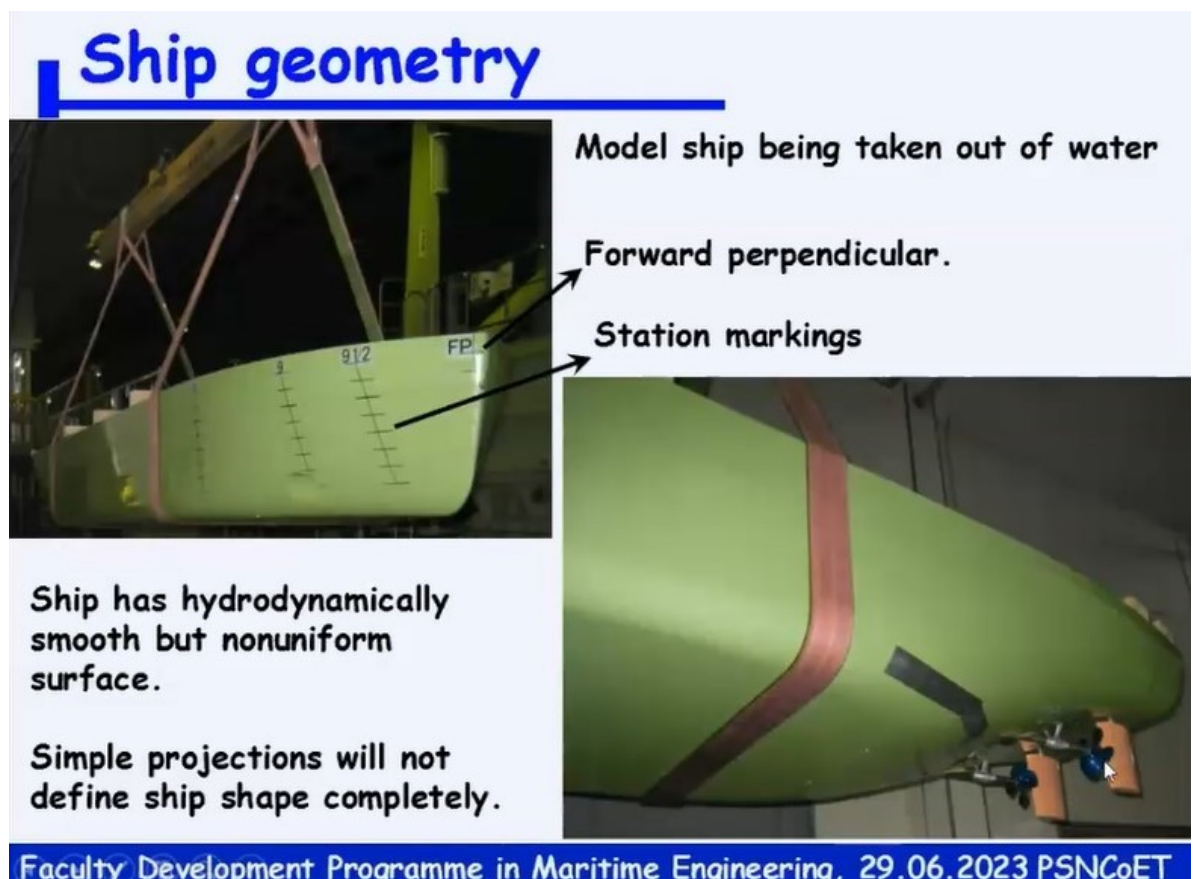
**Session 7**                **10:00-12:00 Hrs.**

***Ship Intact and Damage Stability: Recent Developments***

**Dr. Vishwanath Nagarajan**

Professor and Head, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology (IIT) Kharagpur, Kharagpur – 721 302.

Dr. Vishwanath Nagarajan, Professor and Head, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, delivered an expert lecture on *Ship Intact and Damage Stability: Recent Developments*. In the field of ship building, it is mandatory to carry out testing of a ship model to ensure that all the statutory regulations are complied with by the design. The station markings are done on a model ship as shown in the top left-hand side corner of Figure 7.1. There are two sets of propellers and rudders in the model ship as shown in the bottom right-hand side corner of Figure 7.1. The sheer plan, body plan, and half-breadth plan define the complete shape of the ship. These plans are shown in Figure 7.2. The ship's intact / damage stability is influenced by the geometric characteristics of this volume.

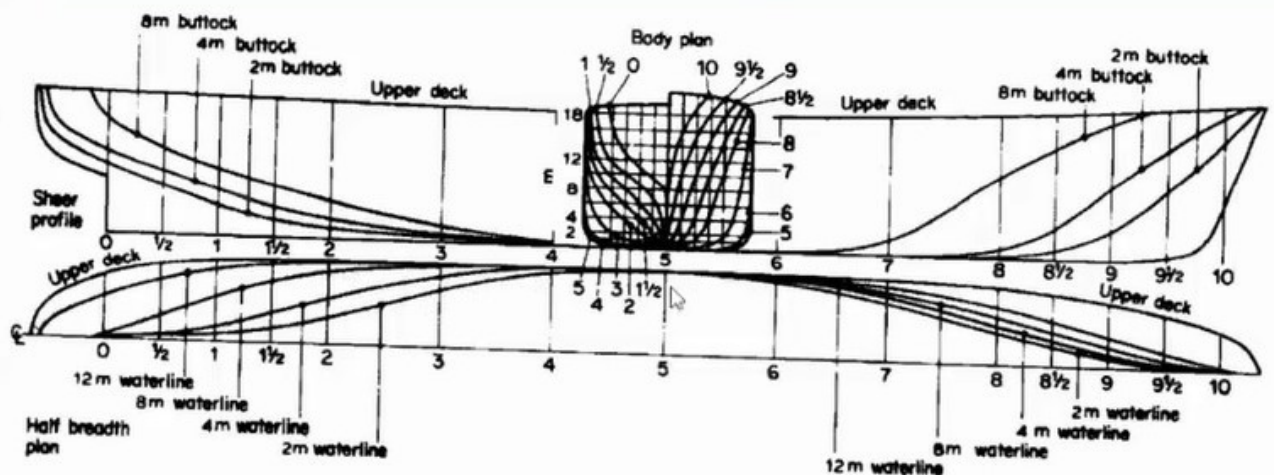


**Figure 7.1 A model ship**





## Lines plan of a ship



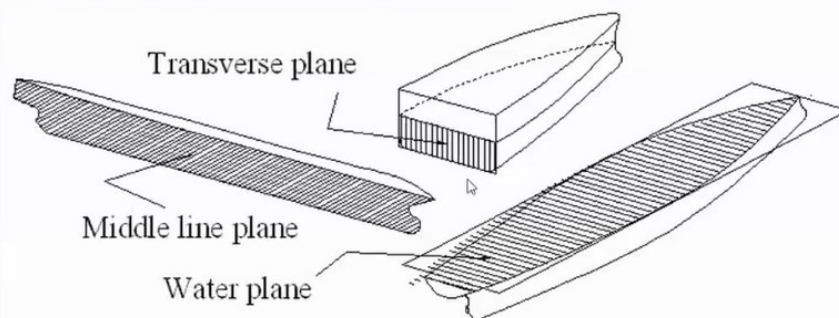
Sheer plan, body plan and half breadth plan define the complete shape of the ship.

The ship's intact/ damage stability is influenced by the geometric characteristics of this volume.

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Figure 7.2 Lines plan of a ship

## Sections of the ship in different plane



To define ship shape, we take sections cut by orthogonal planes.

Ship's are usually symmetric about the middle plane, which is the principal plane of reference.

Water planes may not be parallel to the keel.

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Figure 7.3 Sections of a ship in different planes



Whereas Figure 7.2 shows the exterior details of a ship, Figure 7.3 shows the interior details of the ship. The sections of a ship in the transverse plane, middle line plane, and water plane dictate the hydrodynamic characteristics of a ship. Figure 7.4 shows the nomenclature of a ship. The forward end of the hull of a ship is known as the stem and the rearward end of the hull is called as stern. As seen from the stern side, the left side of the hull is known as a port and the right side of the hull is known as starboard. The top side and the bottom side of the hull are called deck and keel respectively. As shown in Figure 7.5, forward sheer is greater than after sheer to drain the water that enters by waves onto the deck.

For a stationary loaded ship in calm water conditions, the gross weight of the ship (i.e., the sum of tare weight and the cargo weight) is balanced by the buoyant force, which is the weight of water whose volume is equal to the volume of the draught portion (submerged portion, see Figure 7.6) of the ship. When the loaded ship moves in wavy water conditions, the gross weight of the ship is balanced

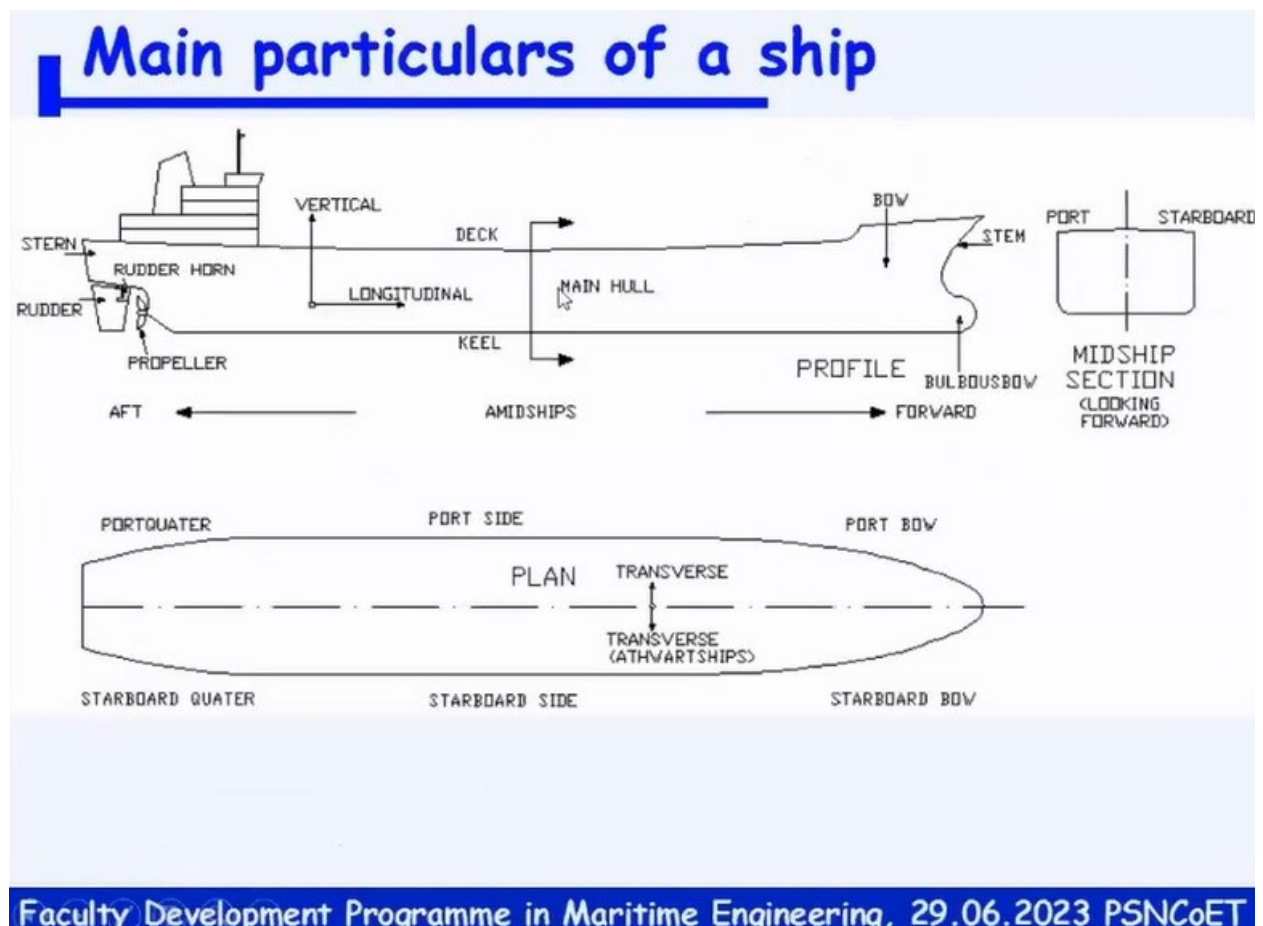
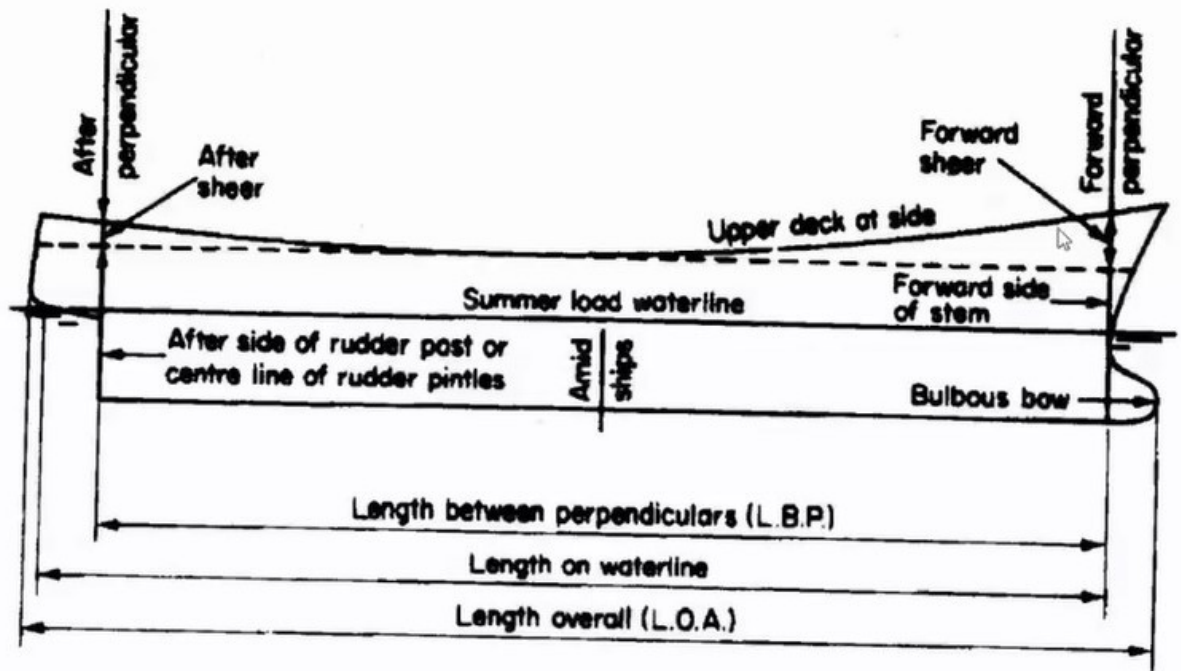


Figure 7.4 Nomenclature of a ship



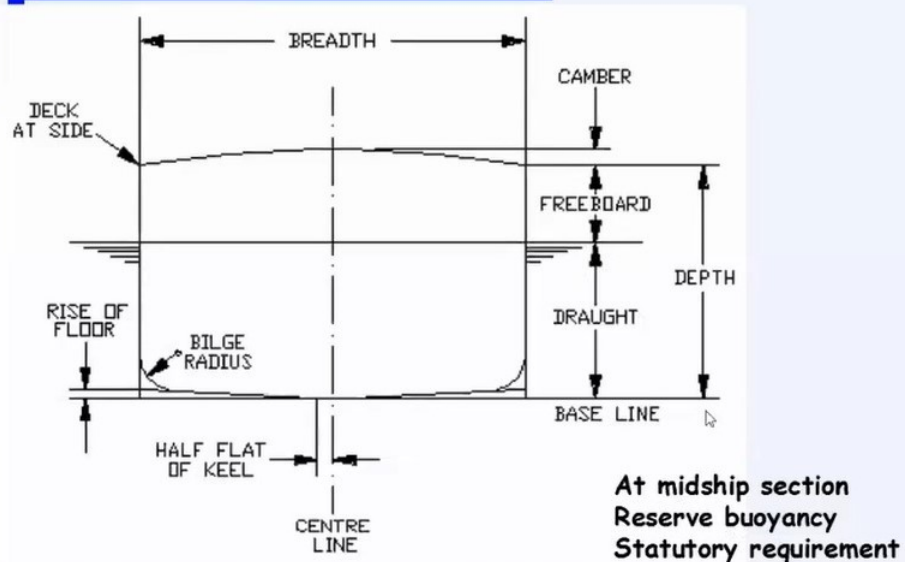
## Important ship terminologies



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Figure 7.5 Nomenclature of a ship

## Freeboard



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Figure 7.6 Necessity of a freeboard in the hull of a ship



by an additional variable buoyant force due to the variable weight of water displaced by the hull whose maximum volume is equal to the volume of the freeboard portion (the portion of the hull above the free surface of the water) of the ship. Thus, the freeboard portion of the hull provides a reserve buoyancy to maintain the upright position of the ship (i.e., stability) under dynamic wave conditions where the position of the waterline changes. Thus, the freeboard is a statutory requirement in the hull design.

An angle of repose, which is smaller than the angle of repose of the cargo material, is provided in the bulkhead (interior upper side of the shell) of a bulk carrier to prevent the formation of air gaps. Formation of air gaps alters the buoyancy force and leads to the instability of the ship. A double bottom in the shell of a bulk carrier ship is provided to prevent instability of the ship during the grounding of the ship. Longitudinal bulkheads are provided in oil tankers to safeguard against the instability of the ship caused by the violent sloshing of oil and its consequent free surface effect. In a container ship, the corner casting method of loading is followed as against the methods of uniform loading in the bulk carrier and oil tanker ships. Spherical gas carriers are used to minimize the heat gain (for example to maintain the liquified natural gas at low temperature) and to maximize the volume for a given surface area. Membrane tanks are more efficient in underwater volume utilization than spherical tanks.

The International Maritime Organization (IMO) is currently in the process of developing performance-based criteria (intact stability criteria) for assessing the following dynamic stability failure modes in waves: dead ship condition, excessive acceleration, pure loss of stability, parametric rolling, and surf-riding/broaching. The physics for these stability failure modes need to be well understood and the evaluation methods need to be developed.

The damage stability criterion stipulates that for a certain extent of damage, the ship should remain stable. There are two methods of damage stability calculations: 1. Deterministic method and 2. Probabilistic method. In any cargo tank that is in the damaged location, the entire oil/gas of that tank is assumed to flow out into the sea. This means that the location of center of gravity (CG) is changed after damage. The new location of CG is computed for stable operation of the ship in damaged condition. An oil tanker ship of more than 225 m in length should be assumed to sustain damage anywhere in its length whereas a gas carrier ship of more than 150 m in length should be assumed to sustain damage anywhere in its length. This shows that the lightship longitudinal centre of gravity of a gas carrier is relatively forward as compared to that of an oil tanker of the same length. For more details of stability requirements in the intact condition as well as the damaged condition of a ship, it is suggested to listen to the recordings of this session.





**Day 4**                      **29.06.2021, Thursday**

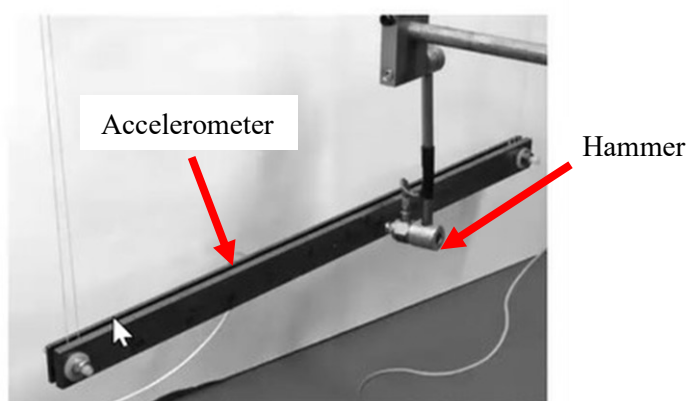
**Session 8**                **14:00-16:00 Hrs.**

***Theoretical and Experimental Perspectives on Structural Dynamics with Application to Ships and Floating Structures***

**Dr. Kiran Vijayan**

Assistant Professor, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology (IIT) Kharagpur, Kharagpur – 721 302.

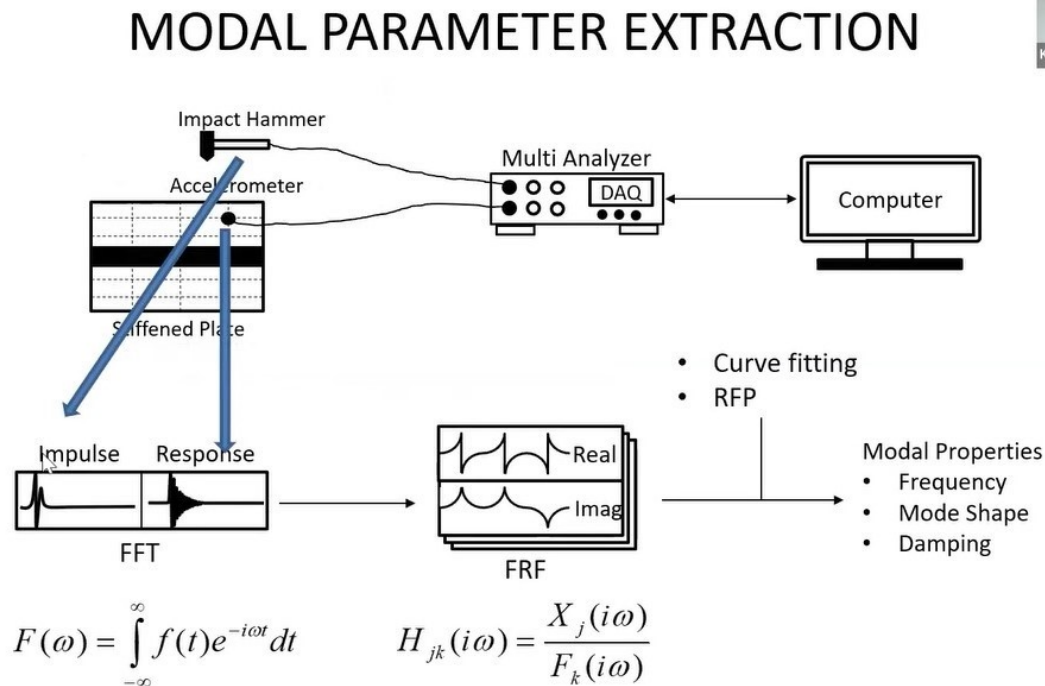
Dr. Kiran Vijayan, Assistant Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, delivered an expert lecture on *Theoretical and Experimental Perspectives on Structural Dynamics with Application to Ships and Floating Structures*. Hammer, shaker, and ambient are actuators which excite a vibration system. Vibrations are measured either by a contact type of device such as an accelerometer or by a non-contact type of device such as a LASER vibrometer. Figure 8.1 shows a modal test setup (a stiffened plate suspended by strings at both of its ends) where an impact hammer is used to excite the system and an accelerometer is used to measure the vibration. The force sensor is fixed to the impact hammer to measure the excitation force. Ocean waves that cause the vibration of an offshore structure are an example of an ambient actuator. A LASER vibrometer uses the Doppler shift in the reflected light to measure the velocity.



**Figure 8.1 Modal test setup**

The following modal parameters are tested: natural frequency, damping, mode shapes, and transfer function. These parameters are the measures of vibration. Figure 8.2 shows the modal testing procedure. Impulse excitation force ( $F(t)$ ) of the impact hammer, measured by the force sensor for time  $t$ , and acceleration response ( $X(t)$ ) of the stiffened plate, measured by the accelerometer are fed through a data acquisition system (DAQ) into a computer. The Fourier transforms (FFT) of  $F(t)$  and  $X(t)$  are computed. A frequency response function (FRF,  $H(i\omega)$ ) is arrived at.  $H(i\omega)$  is the ratio of





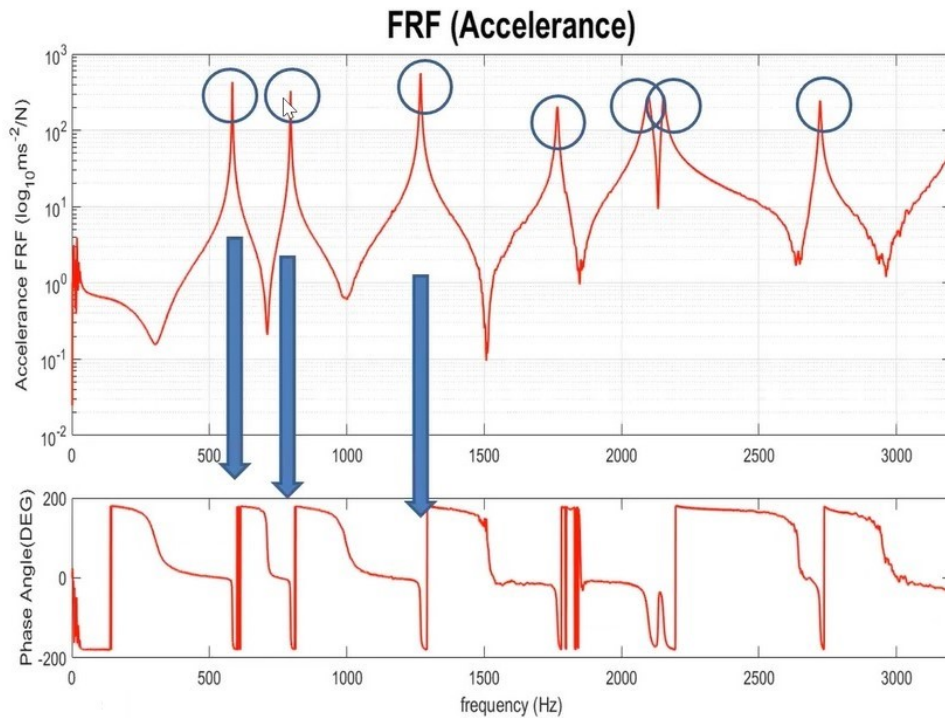
**Figure 8.2 Modal testing procedure**

$X(i\omega)$  and  $F(i\omega)$  where  $X(i\omega)$  and  $F(i\omega)$  are the FFT of  $X(t)$  and  $F(t)$ , respectively. Figure 8.3 shows the FRF or accelerance versus frequency. The points of frequency at which the accelerance is maximum are known as natural frequencies. These peak points are indicated by blue-colored circles. The vibration measurements are done to monitor the health of a structural system. The results of vibration measurements are used to validate the vibration theory. Also, the damping parameters of a structural system can be measured. Vibration measurements can be used for passive control and active control of a system.

A test rig for measuring vibration is shown in Figures 8.4 and 8.5. The rotor consists of a shaft with discs 1 and 2. Discs 1 and 2 have slotted holes at various radii for varying the unbalance in the rotor. The rotor is supported on bearings 1 and 2. An electric motor drives the rotor using a flexible coupling. An accelerometer measures the vibrations in bearing 1.

When the rotational direction of the rotor and the orbiting direction of the center of gravity (CG) of the rotor are the same, it is said that a forward whirl occurs (see Figure 8.6). If the direction of rotation of the rotor and the direction of orbital motion of the CG of the rotor are opposite then a backward whirl is said to occur.

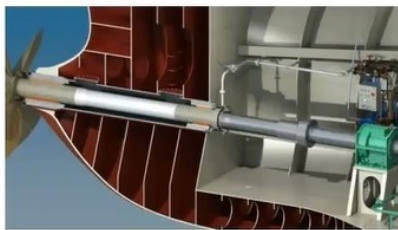




**Figure 8.3 Frequency response function**

**Research problem**

Understand instability due to modal interaction in rotating structure like propeller shaft.



Test rig of shaft supported on hydrodynamic bearing

**Figure 8.4 Test rig for measuring the frequency response function**

Figure 8.7 shows the mathematical model of the conceptual rotor bearing system shown in Figures 8.4 and 8.5. The unbalanced masses in discs 1 and 2,  $m_1$  and  $m_2$ , are the constituents of  $\mathbf{M}$ .

## Conceptual model

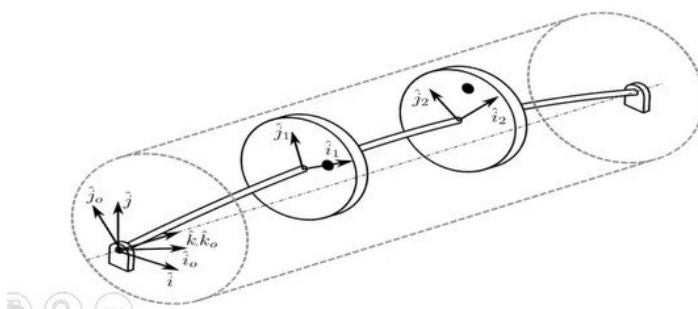
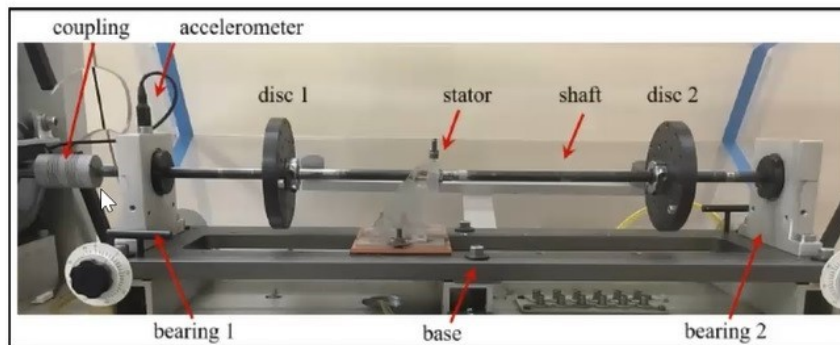


Figure 8.5 Test rig is a conceptual model of a ship propeller

### Observed phenomenon in Rotor

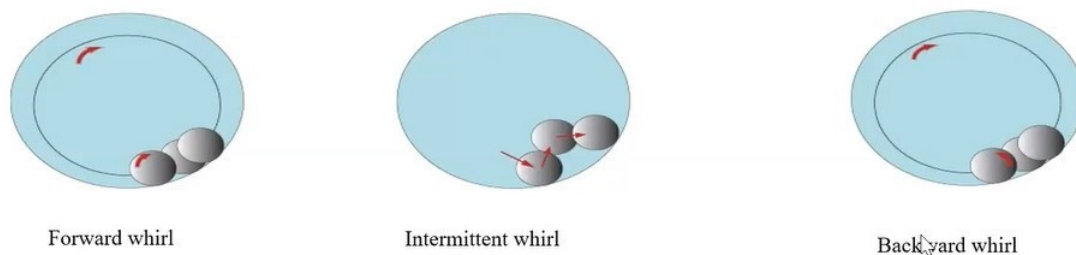
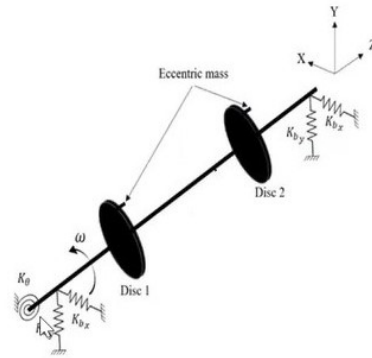


Figure 8.6 Rotor whirls

The stiffness coefficients of bearing 1 along  $x$  and  $y$  coordinates are  $K_{1,x}$  and  $K_{1,y}$ , respectively. Similarly, the stiffness coefficients of bearing 2 along  $x$  and  $y$  coordinates are  $K_{2,x}$  and  $K_{2,y}$ , respectively.



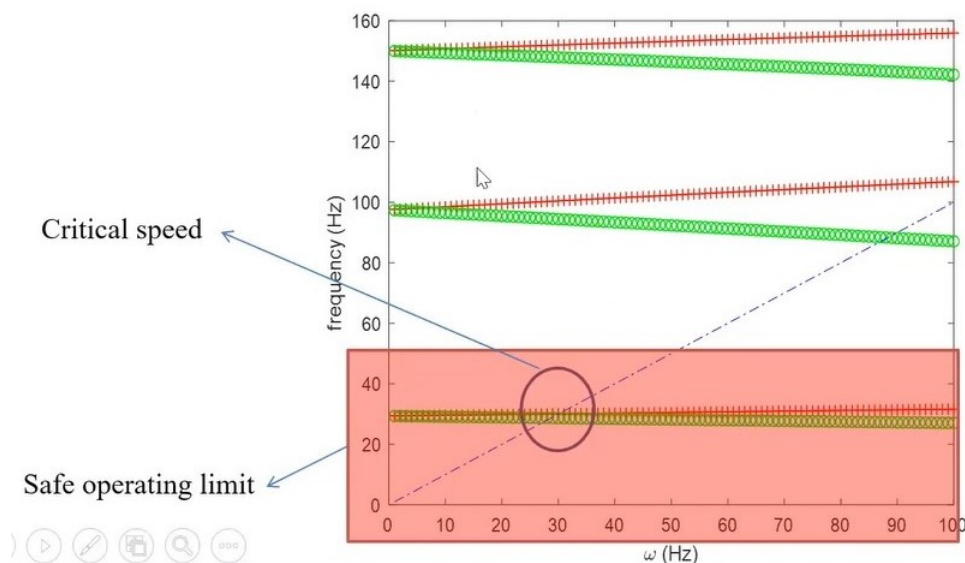




where  $M, C, G, K$  are the mass, damping, gyroscopic, stiffness matrix respectively,  $F$  is the force vector and  $\Omega$  is the rotational speed.

**Figure 8.7 Mathematical model of rotor bearing system**

These four stiffness coefficients form the constituents of  $K$ . Similarly, damping coefficient  $C$  can be arrived at. Using  $M, K, C$ , gyroscopic constant  $G$ , angular velocity  $\Omega$ , force  $F$ , and displacement  $X$ , the following mathematical model of the conceptual rotor bearing system is arrived at:  $M\ddot{X} + (C - \Omega G)\dot{X} + KX = F$ . By solving the mathematical model, the frequency of response  $\nu$  corresponding to each angular velocity  $\omega$  can be computed. A diagram of  $\nu$  versus  $\omega$  is plotted as shown below. This diagram is called the Campbell diagram. The red line corresponds to the forward whirl and the green line corresponds to the backward whirl. A synchronous frequency ( $\nu$  versus  $\omega$ ) line (shown in blue) is drawn. The points of intersection of the blue line with the green line and red line indicate the critical speeds at backward whirl condition and forward whirl condition, respectively. For further details, the reader is suggested to listen to the recordings of this session.



**Figure 8.8 Campbell diagram of rotor bearing system**



**Day 5**                      **30.06.2021, Friday**

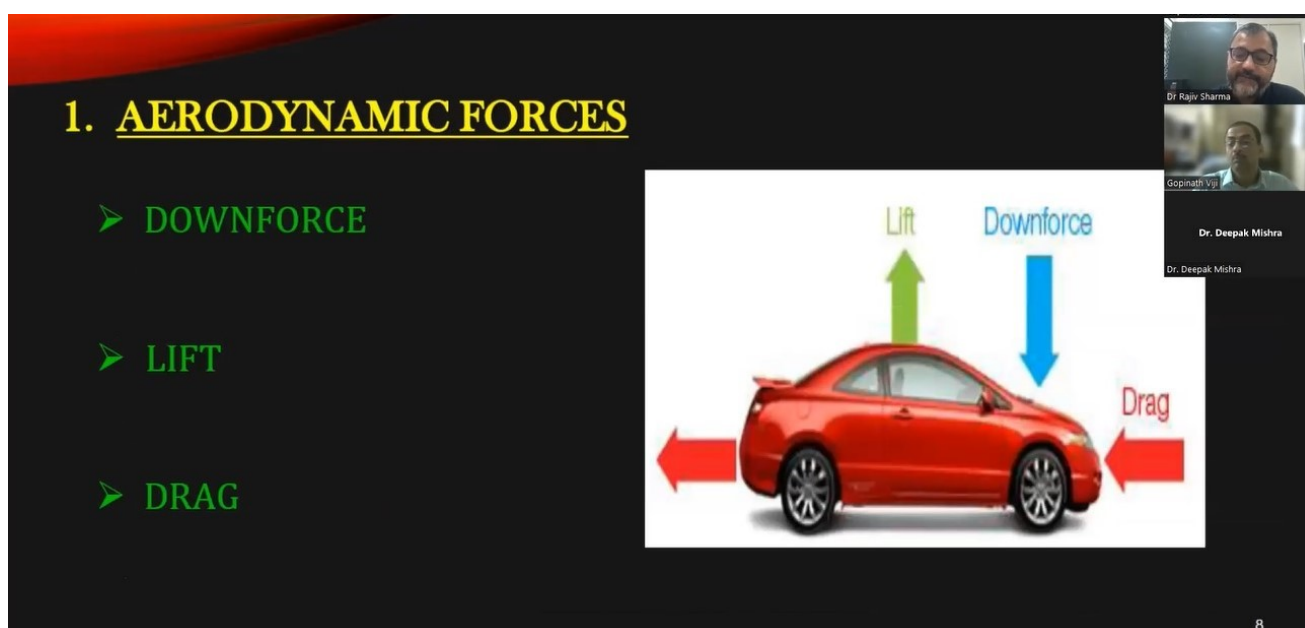
**Session 10**              **14:00-16:00 Hrs.**

***Recent Advances in Drag Reduction***

**Dr. Rajiv Sharma**

Professor, Department of Ocean Engineering, Indian Institute of Technology (IIT) Madras, Chennai – 600 036.

Dr. Rajiv Sharma, Professor, Department of Ocean Engineering, IIT Madras, delivered an expert lecture on *Recent Advances in Drag Reduction*. Aerodynamics is the study of the properties of moving air and the interaction between the air and solid bodies moving through it. The forces that are generated over a body moving in a viscous air are aerodynamic forces. All bodies that are moving in the air experience aerodynamic forces. Aerodynamics has played an important role in car racing since the late 1960s when the introduction of the first inverted wings appeared in some formulas. After that time, improved wing systems taken from the aeronautic technology made leaps forward, improving consistently lap times, increasing cornering speeds and vehicle stability. With the introduction of the ground effect a few years later, the vehicles used a third element (the underbody) to produce downforce, and hence improve the performances. For stable operation of a ship, the distance between the center of buoyancy and the center of gravity is to be minimized. Figure 10.1 shows the aerodynamic forces on a car. The term downforce describes the downward pressure created by the aerodynamic characteristics of a car that allows it to travel faster through a corner by holding the car to the track or



**Figure 10.1 Aerodynamic forces**





road surface. It is a force which arises due to the airflow over and below the car, which acts vertically downward on the car. Also, it increases friction between the tires and the road surface. Thus, it decreases maximum velocity. The various aerodynamic designs on a car to increase the downforce are shown in Figure 10.2. Lift is the upward force that acts on the car, generating the tendency to lift the

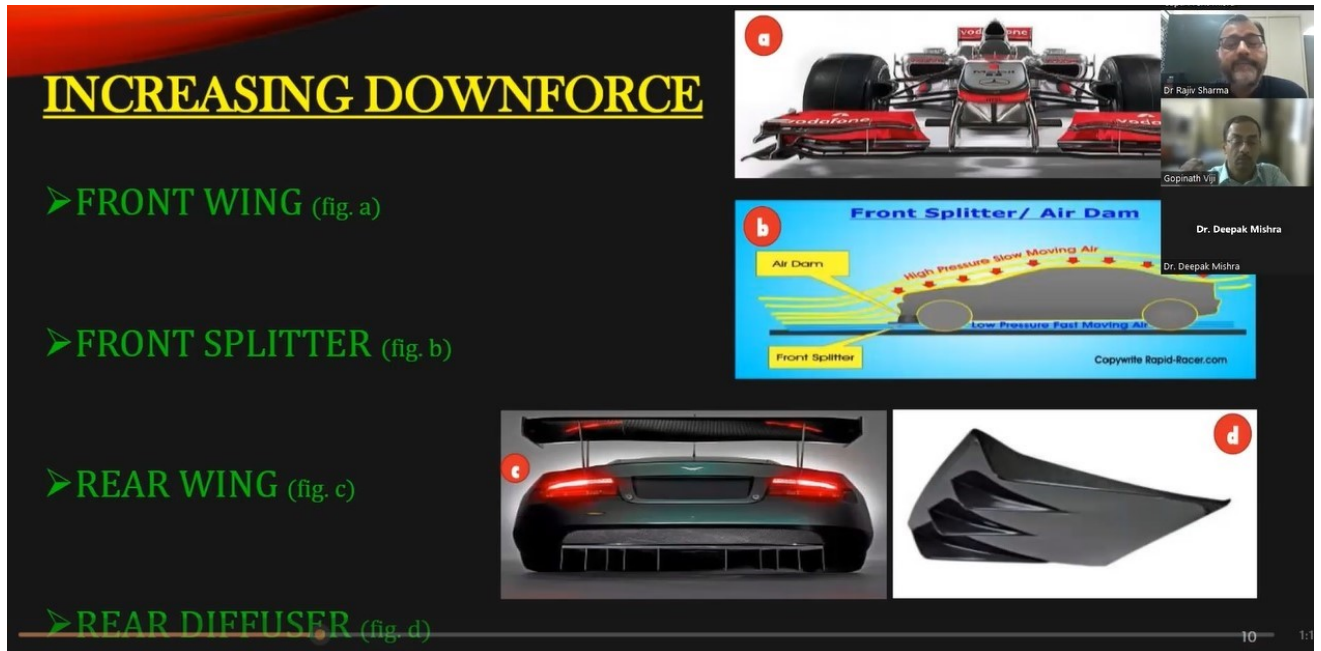


Figure 10.2 Aerodynamic designs in a car to increase the downward force

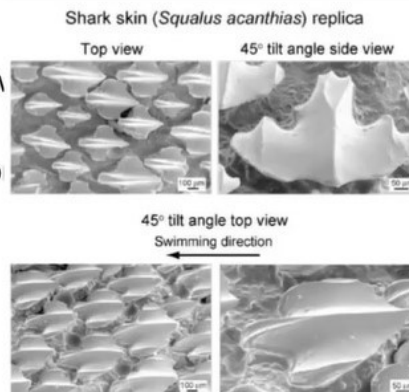


Figure 10.3 Effects of lift on a car

car from the road. See the effects of lift on the car in Figure 10.3. Drag is the air resistance that is caused by the movement of the car. Drag reduces the speed of the car. The drag can be reduced by streamlining the body and reducing the coefficients of drag ( $C_d$ ).  $C_d = 2D / (\rho V^2)$  where  $D$  = drag in N,  $A$  = surface area in  $m^2$ ,  $\rho$  = density of air in  $kg\ m^{-3}$ , and  $V$  = velocity of the body in  $m\ s^{-1}$ .  $D$  can be reduced by: 1. reducing  $C_d$ , 2. reducing  $A$ , 3. reducing  $\rho$ , and 4. reducing  $V$ .

## Drag Reduction Mechanism

- Groves aligned with the flow
- Affect turbulence generation
- Reduce turbulence
- Drag reduction
- Antifouling & self cleaning

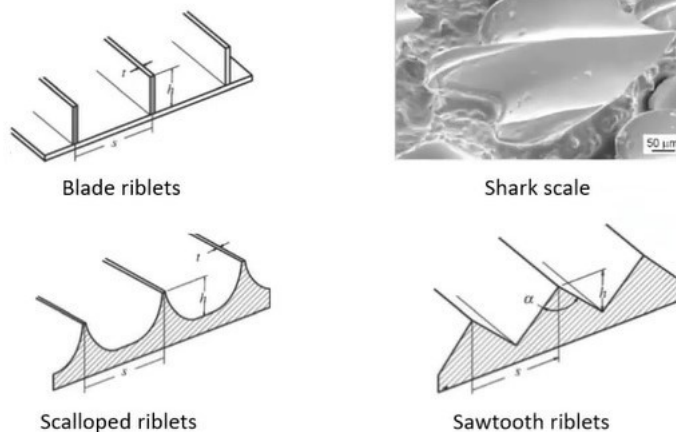


Higher wetted surface → Higher drag?

Dean, B., et al. (2010). *Phil. Trans. R. Soc.* 368, 4775–4806. doi:10.1098/rsta.2010.0201  
IIT Madras

Figure 10.4 Micro-structured surface of the body of a shark skin

## Riblet Geometries



Flow parallel to groves

IIT Madras

Figure 10.5 Riblet geometries



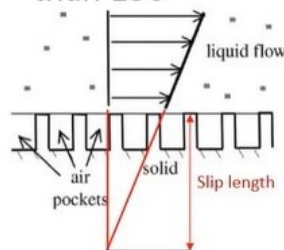


In nature, the surface of the body of a fish has micro-structured scales which aid in reducing the drag. See Figure 10.4 where the micro-structured surface of the body of shark skin is shown. Figure 10.5 shows the riblet geometries. Riblets are grooves aligned with the flow to reduce the drag. The geometries of riblet were derived from the nature of the surface of a shark body. Riblets reduce streamwise vortices. Vinyl-film riblets are implemented in racing yachts.

## Superhydrophobic Surfaces - SHS

- Superhydrophobic?

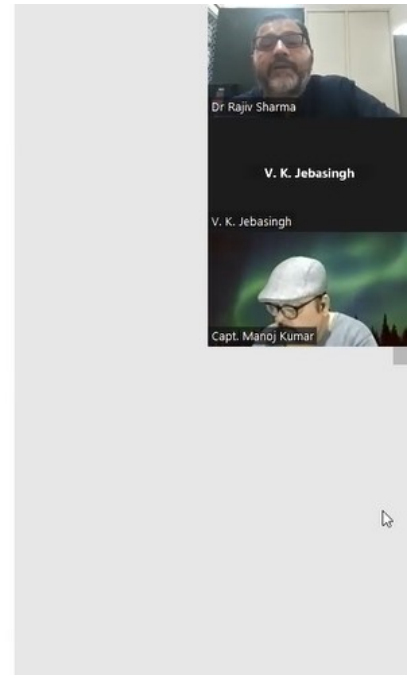
- Wetting contact angle greater than  $150^\circ$



10s of micron of slip length:  
non negligible reduction in  
shear stress

Such surfaces have been manufactured using  
micro- and nanostructures

IIT Madras



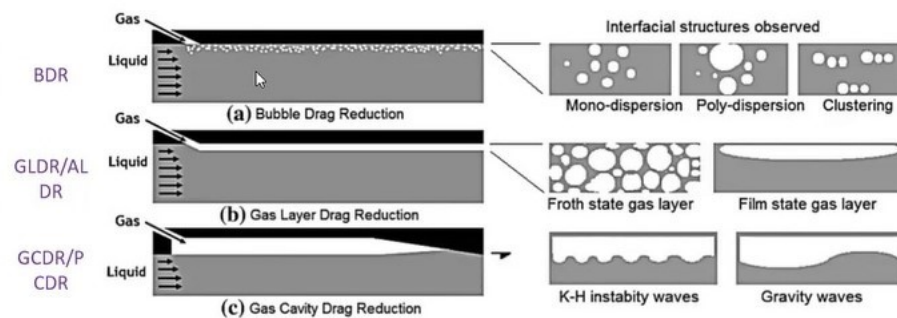
**Figure 10.6 Superhydrophobic surfaces**

The following techniques have been tried to reduce the drag on a ship: polymer injection, large eddy breakup devices, superhydrophobic surfaces, and air lubrication. The concept of superhydrophobic surfaces (see Figure 10.6) has been derived from the nature of the surface in microscale and nanoscale of a lotus leaf. Superhydrophobic surfaces are manufactured using micro- and nano-structures. There is a significant reduction in drag over a few microns slip length of superhydrophobic surfaces.

Figure 10.7 shows a drag reduction technique known as air lubrication. The objective is to introduce an air layer between the bottom of the ship hull and the top surface of the water in the ocean. Air can be introduced either as bubbles, a gas, or a gas cavity. Experimental results using the gas cavity drag reduction technique show that there is a 95% drag reduction over the cavity extent. In the air layer drag reduction (ALDR) technique, the air layer thickness is smaller than the boundary layer thickness. The ALDR technique is cost-effective for ships with flat bottom sides.



# Air Lubrication



Makiharju et al. (2013) J Fluid Mech 732:47–76  
Makiharju et al. (2013) Exp Fluids 54(7):1561

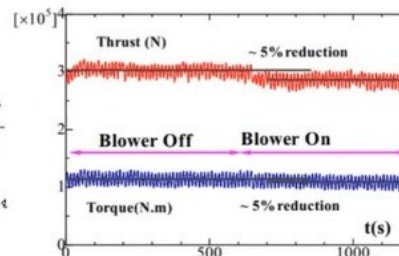
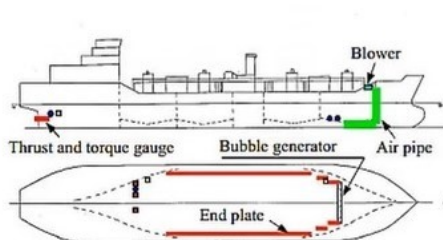
IIT Madras

Figure 10.7 Air lubrication

## Full Scale Tests

Length (m)	120
Breadth (m)	21.4
Draft (m)	4
Speed (kt)	12.4

Ballast Full load  
11% and 6% drag reduction  
7% and 4% energy savings



Hoang, C., Et al. (2009). 19<sup>th</sup> Intl. Offshore and polar engg. Conf., Intl. Soc. of offshore and polar engineers.  
IIT Madras

Figure 10.8 Full-scale tests using air lubrication

Figure 10.8 shows the results of full-scale air lubrication tests carried out on a ship having 120 m length, 21.4 m breadth, 4 m draft, and 12.4 kt speed. Tests under ballast conditions show that there is a drag reduction of 11% and a drag reduction of 6% under full-load conditions. Hence, there are energy savings of 7% and 4% under ballast conditions and full-load conditions respectively. For further details on ship drag reduction techniques, the writer suggests the reader listen to the recordings of this session.





### Analysis of Feedback Received from FDP Participants

The Virtual Faculty Development Programme (FDP) on Maritime Engineering was conducted for one week from 26<sup>th</sup> June 2023 to 02<sup>nd</sup> July 2023. About 60 candidates from various institutions all over India registered for FDP. Feedbacks were received from twenty-six participants of FDP. An analysis of feedback received from the participants was done based on the following four heads: 1. Objectives and Contents of FDP, 2. Coordination and Faculty of FDP, 3. Suggestions for improving the course, and 4. Any other comments? In each of the heads 1 and 2, the following five levels of performance were chosen: Excellent-5, Very Good-4, Good-3, Fair-2, and Unsatisfactory-1.

Under the head 1, the following criteria were included:

- (1.1) How well did the programme meet your expectations?
- (1.2) How well were the stated objectives of the course achieved?
- (1.3) Depth of coverage
- (1.4) Pace of programme
- (1.5) Overall usefulness of the course

Under the head 2, the following criteria were included:

- (2.1) Presentation skill
- (2.2) Response to participants
- (2.3) Management of the course
- (2.4) Audio-visual resources used (if any)

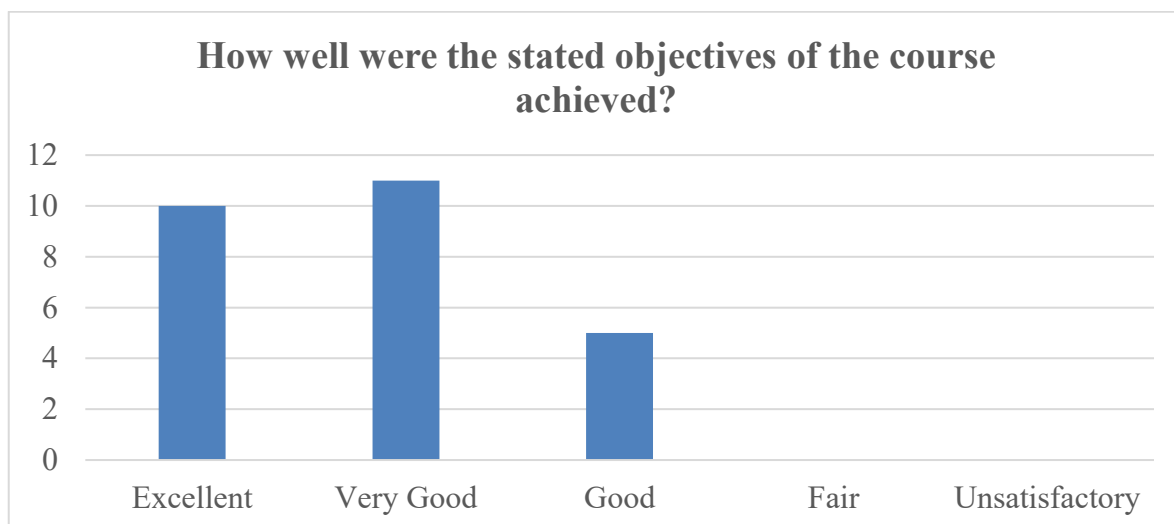
The results of feedback analysis about the above-mentioned criteria are given below.

#### 1. Objectives and Contents of FDP

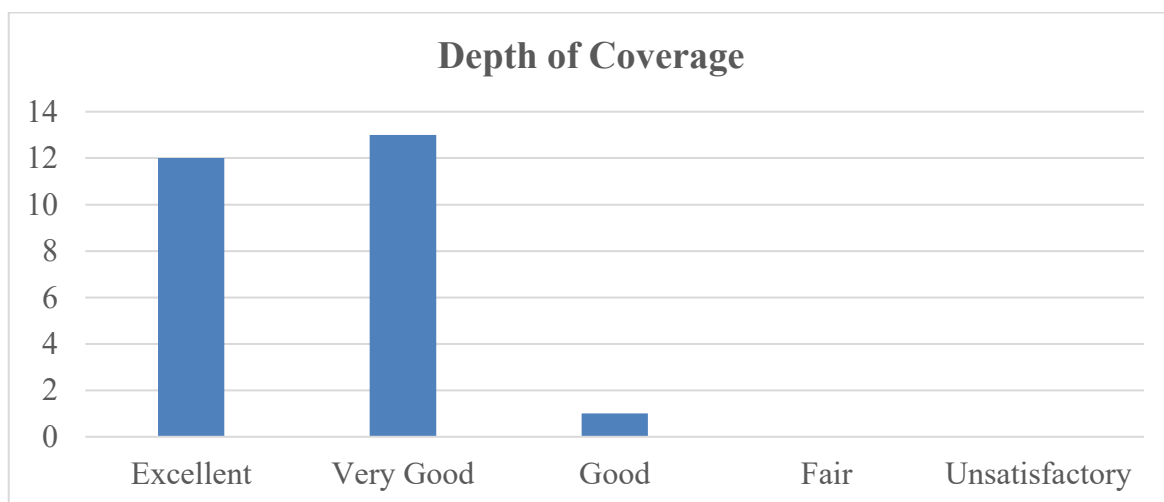


**Feedbacks given by 26 participants for Criteria 1.1**

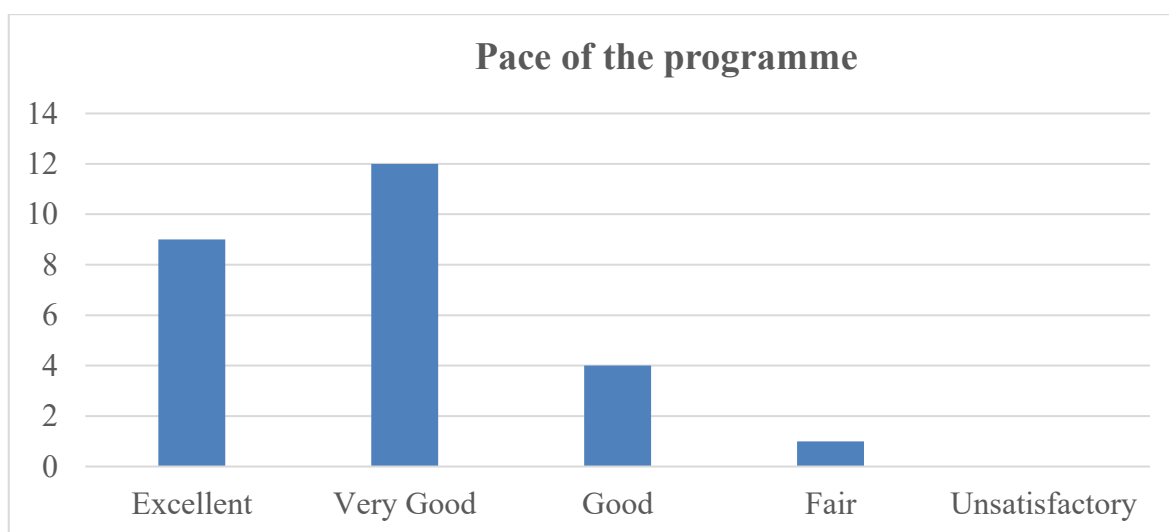




**Feedbacks given by 26 participants for Criteria 1.2**

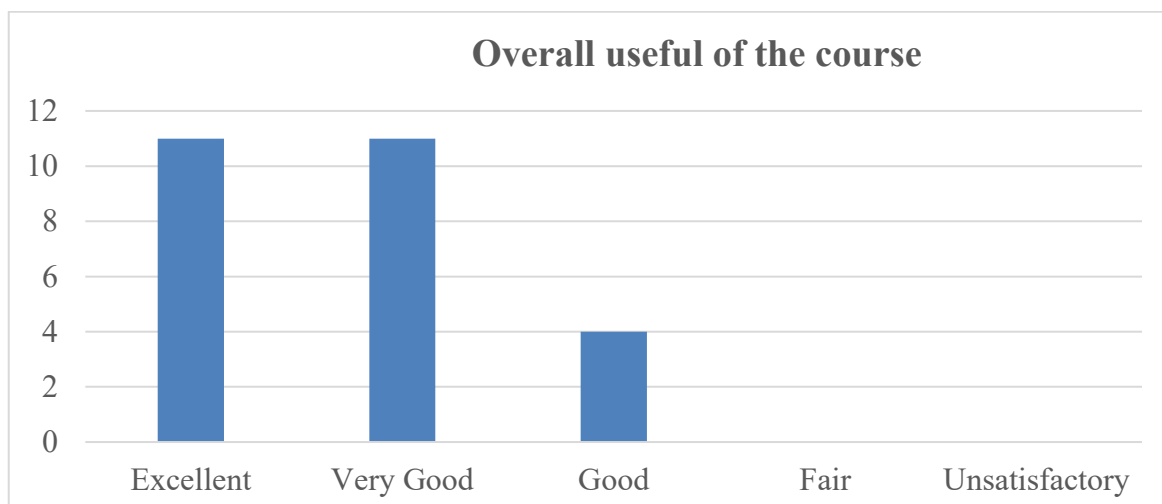


**Feedbacks given by 26 participants for Criteria 1.3**



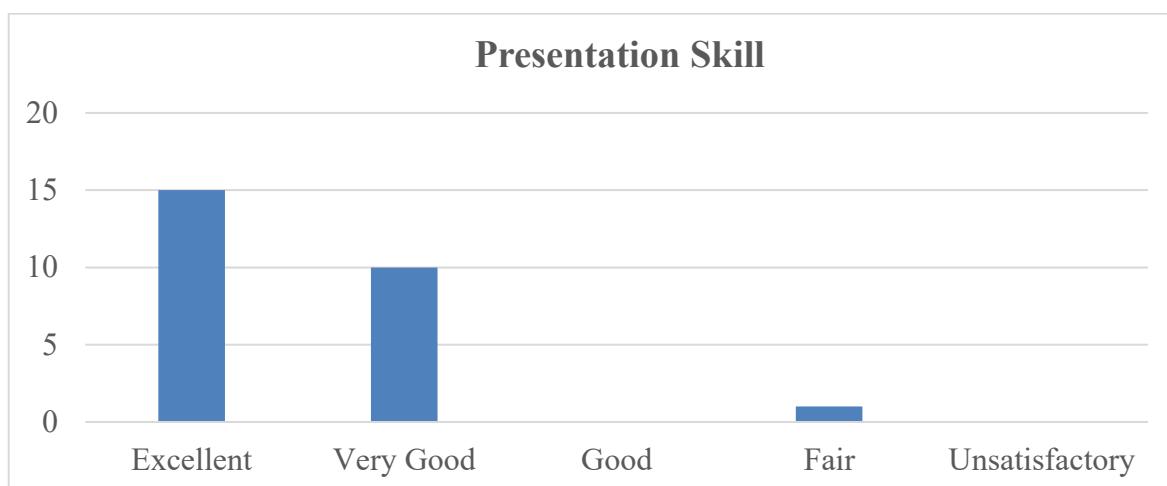
**Feedbacks given by 26 participants for Criteria 1.4**



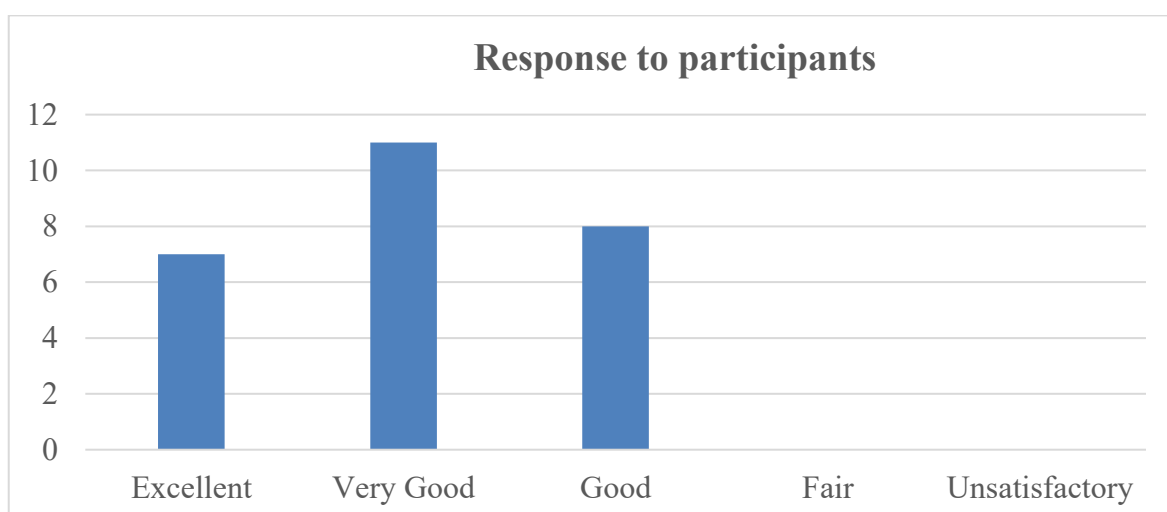


**Feedbacks given by 26 participants for Criteria 1.5**

## 2. Coordination and Faculty of FDP



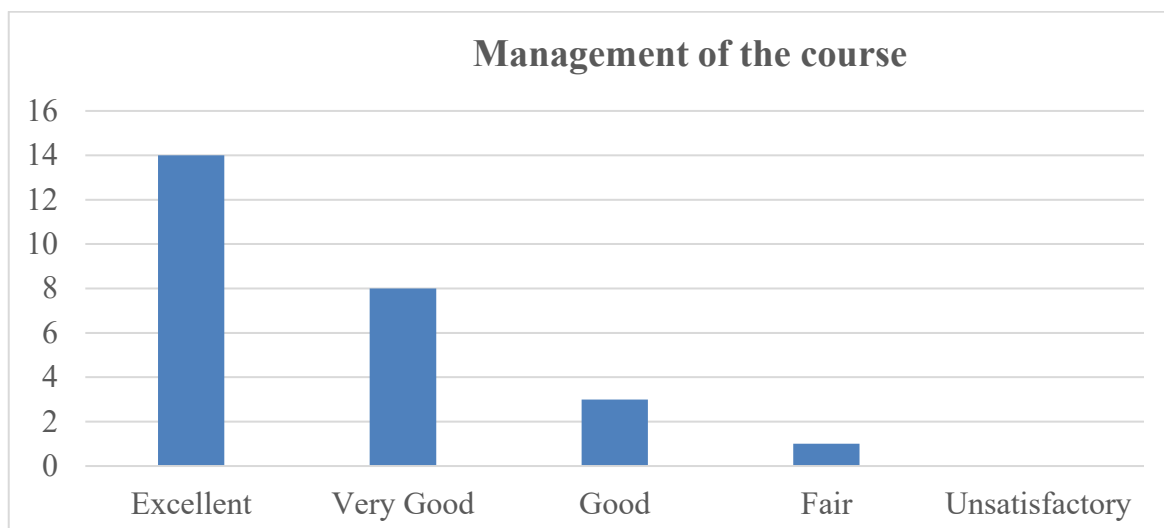
**Feedbacks given by 26 participants for Criteria 2.1**



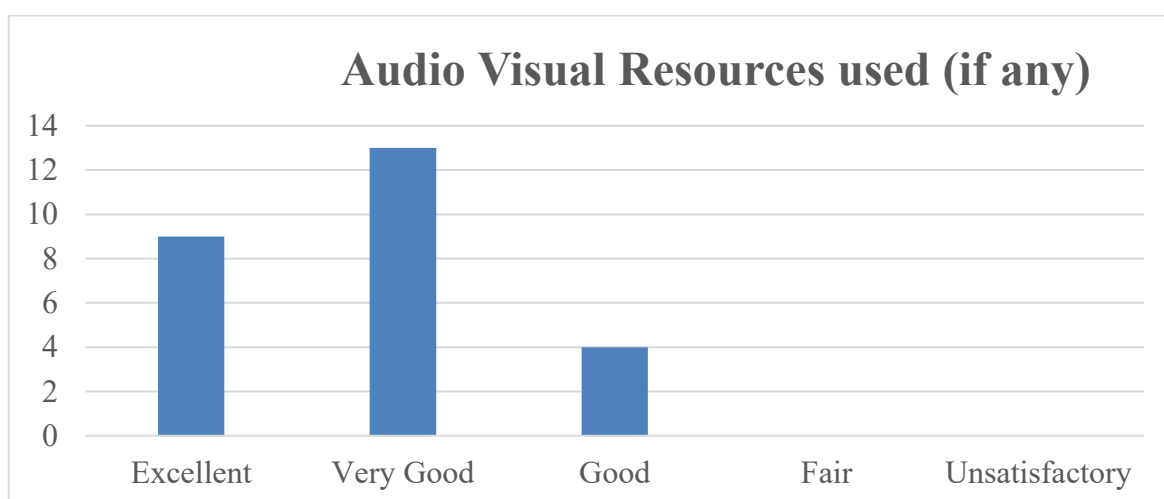
**Feedbacks given by 26 participants for Criteria 2.2**



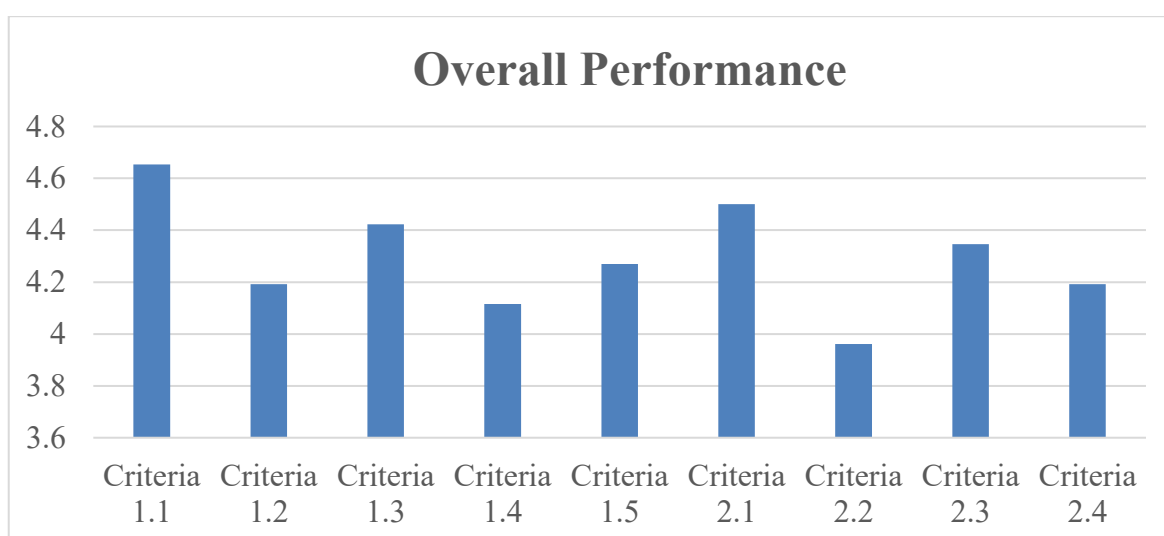




**Feedbacks given by 26 participants for Criteria 2.3**



**Feedbacks given by 26 participants for Criteria 2.4**



**Overall Performance on a Scale of 1-5 for Criteria 1.1-1.5 and 2.1-2.4**



### 3. Suggestions for improving the course

1. Felt that the slides shown during the lectures were not sufficiently big enough to be visible, especially the diagrams.
2. Topics related to shipping should be elaborated more.
3. Excellent course.
4. As it is an FDP, sessions on course delivery, teaching skill development, assessment and evaluation, new teaching methods evolving, etc. also can be included.
5. A session on new technologies like Chapt GPT, AI, Machine Learning, Open book exams, Online courses, etc. can be included.
6. Both the virtual mode and the direct mode of the programme shall be more beneficial in future.
7. The presentations from the resource persons were very useful. Kindly share the presentations.
8. Subjects from Marine Engineering may be selected so that faculty handling that subject can update their knowledge.
9. Everything was organized well.
10. Need some hands-on training.
11. Need more discussions and studies about the zero-emission system.
12. A particular course on marine engineering may be concentrated, for example, ship propulsion.
13. If the Programme content is related to more Case Studies and Real-Life Applications rather than an Analytical base, it could have been more interesting.
14. As per the current trend in the shipping industry, topics on green fuel are indeed a valuable addition to the course.
15. Very good presentation.
16. Very good hard work.
17. Overall course content and delivery were excellent and no suggestions.
18. A particular course on marine machinery may be concentrated, for example, fuel oil systems, etc.
19. The number of video animations may be increased during PowerPoint presentations.
20. Schedule to be maintained.
21. More topics on new regulations and technology can be included matching the decarbonization and digitalization goals of the shipping industry.
22. A few topics on the development of the Indian coastline and port facility can also be included.
23. Include artificial intelligence.



24. Include fuel technology and emission control.
25. Organized well.
26. If possible, kindly share the presentations.
27. Conduct online FDP once in Six Months.

#### **4. Any other Comments?**

1. Thank you very much Dr. Muruganandam Sir for your interest and enthusiasm in organizing such a nice FDP. I was quite happy and learned many new things.
2. Please conduct more such Courses.
3. I Thank PSN college authorities and the FDP coordinators for the excellent conduct of the program. The faculty who did the presentations were excellent and best in their field.
4. More number of faculty development programmes can be conducted.
5. Organized well with pre-planned online class link arrangements and experienced experts.
6. Sir, I thank the coordinator Dr.Muruganandham for organizing the best FDP I had in the marine engineering field. I hope for an opportunity to be there offline next to them so that it will help them all. Hats off to the management of this FDP. It was more than my expectation.
7. Better teaching and understanding presentation.
8. Due to time constraints, limited topics were covered, however, the guest lecturers did an excellent job.
9. All the course objectives are met and all topics are covered in depth
10. Thanks for the courses.
11. A good program with value addition.
12. Presentation slides can be shared among the participants for future reference.
13. We should have a similar session once in 6 months.
14. Thank you for conducting the Faculty Development Program in Marine. In the future add the topic mentioned above which is helpful for updation.
15. The information shared by the speakers covered the topics very nicely. At times we were unaware of the basics of some of the topics. But the speakers started from the basics and then went on to share the in-depth lecture which was very useful.
16. The overall arrangement of organizing FDP was excellent.







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Melathediyoar, Tirunelveli  
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An ISO 9001:2015 Certified Institution  
(Accredited by NAAC with A+, Affiliated to Anna University Chennai)  
**DEPARTMENT OF AERONAUTICAL ENGINEERING**

6.3.3 Details of professional development / administrative training programmes organized by the Institution for teaching and non-teaching staff during the year

Title of the professional development programme organised for teaching staff	Title of the administrative training programme organised for non-teaching staff	No. of participants	Dates (from-to) (DD-MM-YYYY)	Link to the relevant document
Faculty Development Programme on "Computational Fluid Dynamics"		50	26.08.2022	

  
**PRINCIPAL**  
PSN COLLEGE OF ENGINEERING & TECHNOLOGY  
MELATHEDIYOOR, PALAYAMKOTTAI TALUK  
TIRUNELVELI DIST. - 627 152.



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**Proposed List of Expert to Deliver Lecture**

S.No	Expert Name	Designation	Institution Name
1.	Mr. A. Packia Antony Amalan	Assistant Professor	Department of Aeronautical Engineering PSN College of Engineering and Technology Melathediyoar, Tirunelveli

We request you to give permission to organize the above mentioned one day workshop.  
Around 20 participants are expected to attend the above program.

Thanking You

  
Coordinator

  
HoD/Aero 24/10/22

  
Principal



**PSN College of Engineering and  
Technology**

One Day Workshop on

**Computational Fluid  
Dynamics**

26 August, 2022

**Registration Form**

Name :  
Qualification :  
Designation & Dept :  
Institution :  
Address for  
Communication :  
Mobile Number :  
Email ID :  
Date:

Signature of the Participant

Signature of Head of the  
Dept. /Institute with Seal

**ORGANIZING COMMITTEE:**

**CHIEF PATRONS**

Dr. P. Suyambu,  
Chairman,  
PSN Group of Institutions.

Er. P.S.Jayaram,  
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Principal - PSNCET

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Director (Academics & Research) - PSNCET

**HEAD OF THE DEPARTMENT**

Dr.P. Paul Pandian,  
Professor,

Department of Aeronautical Engineering  
PSN College of Engineering and Technology  
Tirunelveli-627152

**CO-ORDINATOR**

Dr.P.Yuvanarasimman,  
Assistant Professor,  
Department of Aeronautical Engineering,  
PSN College of Engineering and Technology,  
Tirunelveli-627152

**Department of Aeronautical**

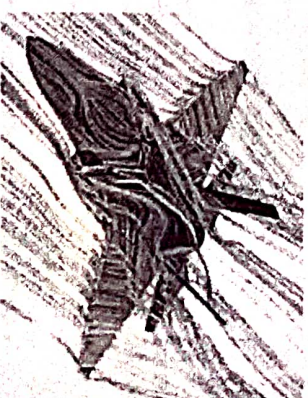
**Engineering**  
Organizes



One Day Workshop on

**Computational Fluid  
Dynamics**

26 August, 2022



Venue:

**BRIAN CENTRE FOR FLOW SIMULATION**

**LABORATORY**

Department of Aeronautical Engineering  
PSN College of Engineering and Technology  
(Autonomous)  
Tirunelveli-627 152.





## ABOUT THE INSTITUTION

An abode of excellence, a pinnacle of glory, a name that deserves mention whenever there initiates a discussion about the world of engineering, PSN College of Engineering & Technology. An autonomous institution. The institution was founded in 2001 with the sole purpose of providing cutting edge technical education that is both accessible and affordable. From the year 2001, the college embarked on programs of expansion in terms of courses and intake, infrastructure and facilities. Presently the college offers 9 U.G courses, 9P.G courses in engineering including MCA and MBA and 5 Ph.D programmes. The College is located at 15 Kms away from Tirunelveli towards the well-known Papanasam, the college is situated at Melathediyoor. The institution is spread over an area of about 200 Acres, and maintains a royal existence with its marvelous infrastructure and widely acclaimed for its meticulous planning, resource scheduling and institutional management.

## ABOUT THE DEPARTMENT

The department was established in 2005. The department has excellent lab facilities with state of the art equipment and it has highly qualified, experienced and committed faculty members. The department gives importance not only to academic education but also ethical values and personality development of students. The students of Aeronautical Department regularly organize various technical and extracurricular events. The department gives continues training program towards the placement of the students with BOSCH Rexroth training centre and also providing Hands on experience in Computational Fluid Dynamics.

## Computational fluid dynamics:

Computational fluid dynamics (CFD) is a branch of fluid mechanics that uses numerical analysis and data structures to analyse and solve problems that involve fluid flows. Computers are used to perform the calculations required to simulate the free-stream flow of the fluid, and the interaction of the fluid (liquids and gases) with surfaces defined by boundary conditions. Ongoing research yields software that improves the accuracy and speed of complex simulation scenarios such as transonic or turbulent flows. Initial validation of such software is typically performed using experimental apparatus such as wind tunnels. CFD is applied to a wide range of research and engineering problems in many fields of study and industries, including aerodynamics and aerospace analysis, hypersonic, weather simulation, natural science and environmental engineering, industrial system design and analysis, biological engineering, fluid flows and heat transfer, engine and combustion analysis, and visual effects for film and games.

## TOPICS

- ❖ Basics of computational fluid dynamics
- ❖ Governing equations of fluid dynamics
- ❖ Continuity, Momentum and Energy equations
- ❖ Conditions
- ❖ Chemical species transport
- ❖ Physical boundary condition
- ❖ Derivation of finite difference equations
- ❖ General Methods for first and second order accuracy
- ❖ Finite volume formulation for steady state
- ❖ Parabolic equations
- ❖ Explicit and Implicit schemes

## Resource Person:

**Mr. A. Packia Antony Amalan,**  
Assistant Professor,  
Department of Aeronautical Engineering,  
PSN College of Engineering and Technology  
627152

## REGISTRATION DETAILS

Selection will be done on first come first served basis. Confirmation of participation is to be made after the selection intimation from the organizers.

## Who can participate:

Faculty members of AICTE approved Institutions, Universities, research scholars and Engineers from R & D Lab

## No Registration Fee

## For Registration-Contact:

**Dr.P.Yuvanarasimman**  
Assistant Professor,  
Department of Aeronautical Engineering,  
PSN College of Engineering and Technology,  
Melathediyoor.  
Tirunelveli – 627 152  
Mobile: 9486931487  
Email: hodaero@psnct.ac.in

**Last date for registration : 25.08.2022**





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PSNCET/Aeronautical/ODD/2022-2023/WS/02

Date: 23.08.2022

**Circular**

**Sub: One day workshop on Computational Fluid Dynamics for faculty – Reg.**

This is to inform you that our Aeronautical Engineering department has going to conduct one day workshop on “Computational Fluid Dynamics” for faculty on 26.08.2022 (08.50 am – 04.30 pm). Interested Faculty of our college shall register their name to the Workshop Coordinator, on or before 25.08.2022.

*Ching*  
HoD / Aero 24/8/22

**To:**

All HoDs / Aero, Civil, CSE, ECE, EEE, EIE, Marine, Mech & Auto, Mechanical, MBA, MCA & SOBES.

**Copy to:**

1. Principal
2. Executive Director
3. Director (Academic & Research)
4. Deans
5. File





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**One day workshop on “Computational Fluid Dynamics”**

**Date: 26.08.2022**

**Venue: Brian Centre for Flow Simulation Laboratory**

**PROGRAM SCHEDULE**

<b>Date and Time</b>	<b>SCHEDULE</b>
08.50 am – 09.50 am	Registration
10.00 am – 10.02 am	Tamil Thai Vazthu
10.00 am – 10.10 am	Welcome Address by Dr.P. Paul Pandian Head of the Department / Aeronautical Engineering
10.10 am – 10.20 am	Presidential Address by Dr.V.Manikandan, Principal, PSNCET
10.20 am – 10.30 am	Felicitation Address by Dr.P.Selvakumar, Executive Director, PSNCET
10.30 am – 10.45 am	Tea Break
10.45 am – 12.40 pm	<b>Mr. A. Packia Antony Amalan</b> Governing equations and boundary conditions, Finite difference and finite volume methods for diffusion, Finite volume method for convection diffusion Flow field analysis, Turbulence models and mesh generation
12.40 pm – 2.00 pm	<b>LUNCH BREAK</b>
02.00pm – 04.00 pm	<b>Mr. A. Packia Antony Amalan</b> Hands on Training on Computational Fluid Dynamics by using Ansys-Fluent software
04.00 pm – 04.30 pm	Valedictory Function
	Vote of Thanks Dr.K.Chandrasekar Department of Aeronautical Engineering





PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Melathediyoor, Tirunelveli

(Approved by AICTE and Recognized by UGC Section 2 (f) and 12 (B))

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(Accredited by NAAC, Affiliated to Anna University Chennai)

One day workshop on "Computational Fluid Dynamics" Attendance details-26.08.2022

S. No	Name of the Participant	Designation / Department	Signature	
			FN	AN
1.	Dr. K. Anu Prasad	AP/mech		
2.	M. Abinaya	IRE/civil		
3.	V. Ramesh	AP/civil		
4.	M. SURESH	AP/civil		
5.	R. Nalin Joshua	AP/mech		
6.	Dr. M. Vigneshwaran	Prof/mech		
7.	S. Mageswaran	AP/mech		
8.	V. Ramkumar	AP/mech		
9.	A. Kavivisuranathan	AP/ECE		
10.	Dr. K. Chandra Sekar	Prof/Aero		
11.	Dr. P. Ponesakki Raja	Asst. Prof/Aero		
12.	R. Karutha Pandi	AP/AERO		
13.	Dr. P. Paul Pandian	Prof/AERO		
14.	A. C. MARIAPPAN	AP/MARINE		
15.	Dr. R. SATHISH RAJA	Prof/Marine		
16.	A. Ganesh	Asst. Prof/DEL		
17.	Dr. P. Prakash	Asst. Prof/DEL		
18.	Dr. J. Leema Rose	Asst. Prof/EEE		
19.	A. Shiny Pradeepa	AP/EEE		
20.	J. Sandhya	AP/EEE		
21.	S. INDHUMATHI	AP/EEE		
22.	P. Muthulakshmi	AP/EEE		
23.	V. Jenitha	AP/EEE		
24.	K. SAKTHIVEL	AP/EEE		
25.	S. R. STALIN	AP/MAE		
26.	—	—	—	—
27.	—	—	—	—

Coordinator

HoD/Aero



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Date: 26.08.2022

**One day workshop on "Computational Fluid Dynamics" Participant List**

S. No	Name of the Participant	Designation / Department	Name of the Institute
1.	Dr. K. Ann Prasad	Ap/mech	PSN CET
2.	M. Abinaya	JRF/civil	PSNCET
3.	M. SURESH	AP/Civil	PSNCET
4.	V. Rameth	Ap/civil	PSNCET
5.	Dr. M. Vijaya kumar	prof/mech	PSNCET
6.	R. Nabin Joshua	AP/mech	PSNCET
7.	S. MAREESWARAN	AP/mech	PSNCET
8.	V. Ramkumar	AP/mec	PSNCET
9.	Dr. K. Chandrasekar	Prof./Aero	PSNCET
10.	A. Kasi Viswanathan	AP/EE	PSNCET
11.	Dr. P. PONESAKKI RAZA	Asst Prof/Aero	PSNCET
12.	R. Karutha Pandi	AP/Aero	PSNCET
13.	Dr. P. Paul Pandian	Prof./Aero	PSNCET
14.	A. C. MARIPPAN	AP/MARINE	PSNCET
15.	Dr. R. SATHEESH RAO	Prof/Min	PSNCET
16.	A. Santhosh kumar	Asst Prof/SoC	PSNCET
17.	Dr. P. PITCHANDI	Asst Prof	PSNCET
18.	Dr. J. Leena Rose	ASP/EEE	PSNCET
19.	A. Shiny Pradeepa	AP/EEE	PSNCET
20.	J. Sathya	AP/EEE	PSNCET
21.	S. INDHUMATHI	AP/EEE	PSNCET
22.	P. Muthulakshmi	AP/EEE	PSNCET
23.	V. Jenitha	AP/EEE	PSNCET
24.	K. SAKTHIVEL	AP/EEE	PSNCET
25.	S. R. STALIN	AP/MAE	PSNCET
26.			
27.			
28.			

  
Coordinator

  
HoD/Aero





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**Report of the Event Conducted**

Title of the Event	One day workshop on Computational Fluid Dynamics
Date & Time	26.08.2022, 8.40am to 4.30 pm
Name(s) of the Resource Persons	Mr. A. Packia Antony Amalan Assistant Professor Department of Aeronautical Engineering, PSN College of Engineering and Technology -Tirunelveli
Name of the Event Coordinator	Dr.P.Yuvanarasimman, Assistant professor /Aeronautical
No. of Participants	25
<b>Event Outcomes</b>	
Upon completion of this workshop, the Faculty members will be able to understand the basic concepts in Computational Fluid Dynamics, Applications of governing equations in real-time applications, Finite Element Method and Finite Difference Method. Faculty members can analyze flow at various boundary conditions with different perception.	
<b>Remarks of the Coordinator about the Event</b>	
A One day workshop was organized in the department of Aeronautical Engineering on 26.08.2022, 8.40am to 4.30 pm, where Dr.P.Yuvanarasimman, Assistant Professor/Aeronautical Engineering was the event coordinator and Mr. Mr. A. Packia Antony Amalan, Professor, Department of Aeronautical Engineering, PSN College of Engineering and Technology, Tirunelveli was the resource person of the one day workshop. However 25 Faculty members were participated and received their participant certificates. The objective of the workshop was to provide Basics of computational fluid dynamics, Governing equations of fluid dynamics Continuity, Momentum and Energy equations conditions, Chemical species transport Physical boundary condition, Derivation of finite difference equations, General Methods for first and second order accuracy, Finite volume formulation for steady state, Parabolic equations, Explicit and Implicit schemes, Hands on training on Computational Fluid Dynamics by using Ansys- Fluent, acknowledged six cognitive levels: knowledge, comprehension, application, analysis, synthesis, and evaluation, with sophistication growing from basic knowledge-recall skills to the highest. Faculty members were impressed about the presentation and training.	

Date: 26.08.2022

*Chief* 26/8/22  
Head of the Department

*Coordinator*  
Coordinator 26/8/22

*W/P*  
26/8/22

# PSN College of Engineering and Technology (Autonomous)



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Date: 26.08.2022

## One Day Workshop on Computational Fluid Dynamics



The one day workshop on Computational Fluid Dynamics is conducted on 26.08.2022. In this event 25 faculties from various departments such as Mechanical, Aeronautical and Electrical department faculties from PSN CET are actively participated. The basics, tools and applications of CFD in the Aeronautical and Mechanical areas are explained by the resource person Mr. A. Packia Antony Amalan Asst.Prof/Aero. The second session was conducted in same day 26.08.2022 A.N, in this session hands on training on CFD software was given to all the participants. This one day workshop is mainly helpful to enhance the employability and innovative in new trends.

HoD/Aeronautical





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## FEEDBACK FORM

Date: 26.08.2022

Venue: Brian Centre for Flow Simulation Laboratory

Event Name: One day Workshop on “Computational Fluid Dynamics”

Organized by: Department of Aeronautical Engineering, PSNCET

Please indicate the extent to which you agree with the following statements

S. No	Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree
1	Information provided at this event is relevant to you				✓	
2	You are likely to use this information in the future			✓		
3	Resources provided at this event are relevant to you				✓	
4	Presentations were interesting					✓
5	You would recommend this event to others			✓		
6	Overall, the event was worthwhile				✓	
7	The venue was suitable				✓	
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

Time duration can be extended

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



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6	Overall, the event was worthwhile				✓	
7	The venue was suitable					✓
8	Refreshments were suitable				✓	

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

Hands on Training

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



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5	You would recommend this event to others					✓
6	Overall, the event was worthwhile					✓
7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

1. Basic information.  
2. Detailed sequencing steps.

10. How could the event be improved?

Thyler Hands on practice.

11. Other comments

Excellent.

THANK YOU FOR YOUR FEEDBACK



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6	Overall, the event was worthwhile					✓
7	The venue was suitable				✓	
8	Refreshments were suitable				✓	

09. What are the two most useful things you got out of the event?

Navier equation

10. How could the event be improved?

11. Other comments

THANK YOU FOR YOUR FEEDBACK .



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8	Refreshments were suitable					/

09. What are the two most useful things you got out of the event?

Flow Analysis

10. How could the event be improved?

Conduct such a event for further improvements

11. Other comments

THANK YOU FOR YOUR FEEDBACK



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6	Overall, the event was worthwhile					/
7	The venue was suitable					/
8	Refreshments were suitable					/

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



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7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

Learned about CFD in product development

10. How could the event be improved?

Good.

11. Other comments

THANK YOU FOR YOUR FEEDBACK

R. Nabin Joshua  
26/08/22



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APPROVED BY IRQS  
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6	Overall, the event was worthwhile				/	/
7	The venue was suitable				/	/
8	Refreshments were suitable				/	/

09. What are the two most useful things you got out of the event?

CFD applications are explained well

10. How could the event be improved?

Good.

11. Other comments

THANK YOU FOR YOUR FEEDBACK

26/8/22



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8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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**THANK YOU FOR YOUR FEEDBACK**



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6	Overall, the event was worthwhile					✓
7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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6	Overall, the event was worthwhile					✓
7	The venue was suitable					✓
8	Refreshments were suitable					✓

9. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



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5	You would recommend this event to others					✓
6	Overall, the event was worthwhile					✓
7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



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4	Presentations were interesting				✓	✓
5	You would recommend this event to others				✓	
6	Overall, the event was worthwhile					✓
7	The venue was suitable				✓	
8	Refreshments were suitable					

09. What are the two most useful things you got out of the event?

\* Presentation skills nice  
\* Idea about CFD basics.

10. How could the event be improved?

11. Other comments

Good Presentation

THANK YOU FOR YOUR FEEDBACK



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6	Overall, the event was worthwhile				✓	
7	The venue was suitable			✓		
8	Refreshments were suitable					

09. What are the two most useful things you got out of the event?

① Introduction about CFD

② Learned also analysis (Flow)

10. How could the event be improved?

Duration of the Event may be increased (Three days FDP)

11. Other comments

Very useful Program.

THANK YOU FOR YOUR FEEDBACK



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8	Refreshments were suitable				/	

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

with practical approach

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11. Other comments

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THANK YOU FOR YOUR FEEDBACK



# PSN COLLEGE OF ENGINEERING AND TECHNOLOGY

Melathediyoar, Tirunelveli – 627 152

(An Autonomous Institution affiliated to Anna University, Chennai )  
Approved by AICTE and Recognized by UGC Under section 2 (f), 12 (B)  
An ISO 9001:2015 Certified Institution

ISO 9001 : 2008  
APPROVED BY IRQS



A DEPARTMENT OF  
INDIAN INSTITUTE OF  
TECHNOLOGY

APPROVED BY  
AICTE

## FEEDBACK FORM

Date: 26.08.2022

Venue: Brian Centre for Flow Simulation Laboratory

Event Name: One day Workshop on "Computational Fluid Dynamics"

Organized by: Department of Aeronautical Engineering, PSNCET

Please indicate the extent to which you agree with the following statements

S. No	Statements	Strongly Disagree	Disagree	neutral	Agree	Strongly Agree
1	Information provided at this event is relevant to you					✓
2	You are likely to use this information in the future					✓
3	Resources provided at this event are relevant to you					✓
4	Presentations were interesting					✓
5	You would recommend this event to others					✓
6	Overall, the event was worthwhile					✓
7	The venue was suitable				✓	
8	Refreshments were suitable				✓	

09. What are the two most useful things you got out of the event?

1. How to generate mathematical models.  
2. Use of CAD

10. How could the event be improved?

11. Other comments

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6	Overall, the event was worthwhile				✓	✓
7	The venue was suitable				✓	
8	Refreshments were suitable				✓	

09. What are the two most useful things you got out of the event?

Get knowledge about CFD, FEA  
FDM

10. How could the event be improved?

Explain with real time applications

11. Other comments

Content delivery was Excellent  
and the program arrangement also Satisfactory

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A DEPARTMENT OF  
HUMAN RESOURCES OF  
SERVICES

UNION ADMINISTRATION  
BANGALORE, K.A.

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3	Resources provided at this event are relevant to you				✓	
4	Presentations were interesting					✓
5	You would recommend this event to others				✓	
6	Overall, the event was worthwhile				✓	
7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

\* Grid generation

\* FEM, FDM & FVM.

10. How could the event be improved?

To provide the study material.

11. Other comments

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HUMAN RESOURCES OF  
SUPPLY

AN ISO 9001:2015  
CERTIFIED INSTITUTION

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4	Presentations were interesting				✓	✓
5	You would recommend this event to others				✓	✓
6	Overall, the event was worthwhile					✓
7	The venue was suitable					✓
8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

Ideology about CFD  
Learn the Basics

10. How could the event be improved?

NIL

11. Other comments

Nothing

THANK YOU FOR YOUR FEEDBACK





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8	Refreshments were suitable					✓

09. What are the two most useful things you got out of the event?

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10. How could the event be improved?

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11. Other comments

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**PSN COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)**

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(Accredited by NAAC, Affiliated to Anna University Chennai)

**DEPARTMENT OF AERONAUTICAL ENGINEERING**

**PSNCET/Aeronautical/ODD/2022-2023/WS/01**

**Date: 23.08.2022**

From,

The Head of the Department,

Department of Aeronautical Engineering,

PSN College of Engineering and Technology (Autonomous),

Melathediyoar – 627 152.

To,

The Principal ,

PSN College of Engineering and Technology (Autonomous),

Melathediyoar – 627 152,

Sub: Permission to organize one day workshop on “**Computational Fluid Dynamics**” on  
26.08.2022-Reg

Respected Sir,

We are planning to organize a one day workshop on “**Computational Fluid Dynamics**” for the faculty from engineering colleges on 26.08.2022 (08.50 am – 04.30 pm).

Content of the Workshop:

- ❖ Basics of computational fluid dynamics
- ❖ Governing equations of fluid dynamics
- ❖ Continuity, Momentum and Energy equations Conditions
- ❖ Chemical species transport
- ❖ Physical boundary condition
- ❖ Derivation of finite difference equations
- ❖ General Methods for first and second order accuracy
- ❖ Finite volume formulation for steady state
- ❖ Parabolic equations
- ❖ Explicit and Implicit schemes
- ❖ Hands on training on Computational Fluid Dynamics by using Ansys- Fluent