



CENTURION UNIVERSITY OF TECHNOLOGY & MANAGEMENT, BOLANGIR

Faculty Development Program on CFD

Date: 17-08-2020
Resource Person Details: Dr. Sekhar Majumdar
Faculty Participated: 165 Participants

Dr. Sekhar Majumdar is Professor in Department of Mechanical, NMIT Bangalore, Head Center for Computational Fluid Dynamics, NMIT Bangalore and Former Head, CTFD Division , (CSIR) NAL , Bangalore, India

Detailed report of the activity:

A Faculty Development Program was organized by the Centurion University of Technology and Management dated 17.08.2020 on " **CFD- A Potential CAE Tool for Engineering Design** " (ONLINE MODE). The resource person Dr. Sekhar Majumdar, Professor in Mechanical Engineering Branch, NMIT, Bangalore addressed the fundamentals of computational fluid dynamics and its application to various industries. In this program around 165 participants participated and learned about the various mathematical correlations used in fluid mechanics and how to use it in complex real-world computations. Further, Dr. Majumdar also addresses various CFD software used in various applications to accurately solve fluid flow problems.

As an ending remark he gave more suggestions to the participants and thanked the participants and ended the session with summarizing the whole session.



Centurion
UNIVERSITY

WEBINAR ON

COMPUTATIONAL FLUID DYNAMICS

DATE: 17-08-2020

Organised by :

**Centurion University of Technology and
Management**

Resource Person

Dr. Sekhar Majumdar

Professor in Department of Mechanical, NMIT Bangalore, Head
Center for Computational Fluid Dynamics, NMIT Bangalore and
Former Head, CTFD Division , (CSIR) NAL , Bangalore, India

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HOW TO SOLVE A FLUID MECHANICS PROBLEM?

- **Theoretical (Analytical) Fluid Dynamics (TFD or AFD)**
 - Analytical solution of the mathematical equations of fluid motion possible only under (Over -7) simplifying approximations
- **Experimental Fluid Dynamics (EFD)**
 - Extensive measurement on scaled down models under simulated conditions using state-of-the-art instrumentation Hot Wire, LDV, Particle Image Velocimetry , Laser Induced Fluorescence
 - Wind Tunnel, Water Tunnel or Towing Tank tests
- **Computational Fluid Dynamics (CFD)**
 - Mathematical Models in terms of Conservation Laws represent the flow physics in terms of strongly coupled non-linear partial differential equations
 - Advent of high speed Digital Computer & powerful numerical methods make numerical solution of the flow equations possible in reasonable time
 - CFD today is an alternative cost-effective means of simulating real-life flows

SEQUENCE OF SIMPLE BASED ALGORITHM RANS3D



STRUCTURED Vs UNSTRUCTURED GRIDS

Structured Grid

- Algebraic or Differential method used for generation
- Implicit connectivity between nodes
- Control Volumes Quadrilateral (2D) / Hexahedral (3D)
- Difficult to handle complex multi body geometry
- Grid Adaptation difficult



Structured C Grid around an Airfoil

Unstructured Grid

- Delaunay Triangulation/Advanced Front Technique
- Connectivity between nodes specified explicitly
- Control Volumes polygonal (2D) or polyhedral(3D)
- Grid generation easy for complex geometries
- Data structure suitable for easy grid adaptation
- Increase in data storage and more book keeping



Unstructured Triangular elements around a four element Airfoil

APPLICATION PROBLEMS SOLVED USING RANS3D CODE

Title	Sponsor	Year
Flow around Submarine Sonar Dome, WGT & AGT Torpedo	Naval Science & Technology Laboratory (NSTL, DRDO), Visakhapatnam	1993-1995
Flow around DWR Radome Structures	ISTRAC (ISRO), Bangalore	1997-1999
Ship Hydrodynamics and Highly Slewted Marine Propeller	NSTL, Visakhapatnam	1997-1999
Turbulence Modeling for flow around Aerofoils	NAL-CAE (Chinese Aerospace Establishment) Collaboration	1998-2000
Flow around Aerostat Balloons with Fins	Aerial Delivery Research & Dev. Estt. (ADRDE, DRDO), AGRA	1998-2000
Bluff Body Hydrodynamics -- RANS & LES	Naval Research Board (NRB), DRDO	2003-2007
Flow past P15 Ship Hull with Bow Mounted Sonar Dome	NSTL, Visakhapatnam	2003
Cooling System of Airborne Radar Configuration	Centre for Airborne Systems (DRDO), Bangalore	2005-2007

List of Participants

S.NO.	FACULTY	DESIGNATION
1	Dr. Ashok Mishra	Professor
2	Dr. Banitamani Mallik	Professor
3	Mr. Balaji Padhy	Assistant Professor
4	Dr. Prasanta Kumar Rath	Associate Professor
5	Dr. Satyanarayan Dhal	Assistant Professor
6	Dr. Subhasmita Mishra	Assistant Professor
7	Mr. Gouri Kumar Sahu	Assistant Professor
8	Dr. Satya Prakash Nanda	Professor
9	Dr. Narayan Gouda	Assistant Professor
10	Dr. Rosy Mallik	Assistant Professor
11	Dr. Santosh Kumar Nanda	Assistant Professor
12	Dr. Sivala Kumar	Professor
13	Dr. Kakani Grihalakshmi	Associate Professor
14	Dr. Gitanjali Behera	Assistant Professor
15	Dr. Rajashree Jena	Assistant Professor
16	Ms. Sharmistha Sahu	Assistant Professor
17	Dr. Vivek Kumar	Assistant Professor
18	Mr. Shekhar Kumar Sahu	Assistant Professor
19	Dr. Santosh D.T.	Assistant Professor
20	Ms. Soma Majhi	Assistant Professor
21	Mr. Bhisma Narayan Ratha	Assistant Professor

22	Dr. Prasanta Kumar Choudhury	Assistant Professor
23	Dr. Ashish Ranjan Dash	Associate Professor
24	Ms. N. Jeebaratnam	Assistant Professor
25	Mr. Sandipan Pine	Associate Professor
26	Mr. Satyanarayan Padhy	Assistant Professor
27	Mr. Rajesh Kumar Mishra	Assistant Professor
28	Mr. Prabhat Kumar Patnaik	Assistant Professor
29	Dr. Prafulla Kumar Panda	Assistant Professor
30	Dr. Rajib Kumar Majhi	Assistant Professor
31	Mr. Vishal Kumar Singh	Assistant Professor
32	Dr. P. Srinivasa Rao	Professor
33	Mr. Mir Sadat Ali	Associate Professor
34	Dr. Vijay. Miditana	Associate Professor
35	Dr. N. B. Karthik Babu	Assistant Professor
36	Dr. Nagesh Kolagani	Professor
37	Ms. A. Abhilasha	Assistant Professor
38	Mr. Debendra Maharana	Assistant Professor
39	Mr. Md. Sameen Chishti	Assistant Professor
40	Mr. Abinash Panda	Assistant Professor
41	Mr. Sambeet Patro	Assistant Professor
42	Prof.(Dr) M. Devender Reddy	Professor cum Dean Acad
43	Dr. Sagar Maitra	Professor
44	Prof.(Dr) Gouranga Ch. Mishra	Professor

45	Dr. Tanmoy Shankar	Associate Professor
46	Dr. Subhashisa Praharaj	Assistant Professor
47	Ms. Jnana Bharati Palai	Assistant Professor
48	Ms. Deepthi Chandaka	Assistant Professor
49	Mr. Santosh Kumar Lenka	Assistant Professor
50	Ms. Pilli Manasa	Asst. Professor
51	Dr. Pushpalatha G.	Professor
52	Dr. Koustava Kumar Panda	Associate Professor
53	Ms. Preetha Bhadra	Assistant Professor
54	Dr. Satyabrata Nanda	Assistant Professor
55	Mr. Chitrasena Padhy	Assistant Professor
56	Dr. Atanu Deb	Associate Professor
57	Dr. Satarupa Modak	Assistant Professor
58	Dr. Akkamahadevi Naik	Assistant Professor
59	Dr. Ashok Kumar	Assistant Professor
60	Dr. Rahul Adhikary	Associate Professor
61	Dr. Arunabha Pal	Associate Professor
62	Dr. Saurav Barman	Associate Professor
63	Dr. Pedda Ghouse Peera S.K.	Assistant Professor
64	Dr. Shiv Kumar Udayana	Assistant Professor
65	Dr. Merugu Chandra Surya Rao	Assistant Professor
66	Dr. Nilanjana Datta	Assistant Professor
67	Ms. Basubadatta Sahu	Assistant Professor

68	Dr. Samapika Dalai	Assistant Professor
69	Dr. Anindita Roy	Assistant Professor
70	Ms. Barsha Tripathy	Assistant Professor
71	Dr. Smaranika Mohanta	Assistant Professor
72	Dr. Anant Tamang	Assistant Professor
73	Ms. Sonia Panigrahi	Assistant Professor
74	Ms. Chinmayee Patra	Assistant Professor
75	Dr. Soumik Ray	Assistant Professor
76	Dr. Raghu Gogada	Professor
77	Dr. Udit Nandan Mishra	Assistant Professor
78	Dr. Gaikward D.J.	Assistant Professor
79	Dr. Praveen Boddna	Professor
80	Dr. Ria Mukhopadhyay	Assistant Professor
81	Dr. Gagan Kumar	Assistant Professor
82	Ms. Abhinandita Sahoo	Assistant Professor
83	Dr. Praveen Kumar	Assistant Professor
84	Prof.(Dr) V. Narasimha Reddy	Professor
85	Dr. Kalidindi Krishnam Raju	Associate Professor
86	Dr. Hari Ram Kumar Bandi	Assistant Professor
87	Mr. Durgadatta Mehera	Assistant Professor
88	Dr. Niranjan Kumar Chaurasia	Assistant Professor
89	Dr. Sudhanshu Bala Nayak	Assistant Professor
90	Mr. Ajit Kumar Sahu	Assistant Professor

91	Ms. Lipsa Dash	Assistant Professor
92	Mr. Manisankar Bera	Assistant Professor
93	Mr. Chandrasekhar Sahu	Assistant Professor
94	Prof.(Dr) K. Satya Krishna Prasad	Professor cum Dean
95	Dr. Devanand T. N.	Assistant Professor
96	Dr. Sambid Swain	Assistant Professor
97	Dr. Amrutha Gopan	Assistant Professor
98	Mr. Biswajit Mohanty	Assistant Professor
99	Mr. Avijit Biswas	Assistant Professor
100	Ms. Hauzoukim	Assistant Professor
101	Dr. Anita Patra	Professor
102	Dr. Subhendu Kumar Mishra	Associate Professor
103	Dr. Durga Prasad Padhi	Associate Professor
104	Dr. Parle Kalyan Chakravarty	Assistant Professor
105	Dr. S. Kameswar Rao	Assistant Professor
106	Mr. Kalee Prasanna Patnaik	Assistant Professor
107	Dr. Debi Prasad Satapathy	Assistant Professor
108	Mr. Amit Kumar	Assistant Professor
109	Dr. Prajna Pani	Professor
110	Dr. Susanta Kumar Patnaik	Assistant Professor
111	Dr. Girish Prasad Rath	Assistant Professor
112	Dr. Amir Prasad Behera	Assistant Professor
113	Nandakishore Ray	Asst. Professor

114	Smita Jana	Asst. Professor
115	Jagannath Padhy	Assistant Professor
116	Tofan Kumar Nahak	Assistant Professor
117	Dr. Chandra Sekhar Dash	Professor
118	Dr. Chinmayee Dora	Asst. Professor
119	Jagannath Padhi	Professor
120	Dr. Abhinna Chandra Biswal	Professor
121	Dr. Sudhansu Kumar Samal	Associate Professor
122	Dr. Rajendra Kumar Khadanga	Associate Professor
123	Dr. Ardhendu Mouli Mohanty	Professor
124	Dr. Ramesh Chandra Mohanty	Professor
125	Dr. Laxman Kumar Malla	Asst. Professor
126	Dr. Nitesh Dhar Badgayan	Asst. Professor
127	Prajna Paramita Debata	Asst. Professor
128	Babuli Kumar Jena	Asst. Professor
129	Dilip Kumar Mohanta	Asst. Professor
130	Dr. Kapileswar Mishra	Professor
131	Dr. Kamal Kumar Barik	Associate Professor
132	Dr. Siba Prasad Mishra	Associate Professor
133	Sagarika Panda	Asst. Professor
134	Snigdha A Sanyal	Asst. Professor
135	Sadhana Devi	Asst. Professor
136	Vignesh M.	Asst. Professor

137	Mr. Vignesh	Assistant Professor
138	Dr. Sujata Chakravarty	Professor & HOD
139	Dr. Sangram Keshari Swain	Associate Professor
140	Dr. Sabyasachi Mohanty	Associate Professor
141	Dr. P Annan Naidu	Asst. Professor
142	Dr. Bhabendu Kumar Mohanta	Asst. Professor
143	Sasmita Kumari Nayak	Asst. Professor
144	Manoj Kumar Behera	Asst. Professor
145	Mamata Garanayak	Asst. Professor
146	Suwendu Kumar Nayak	Asst. Professor
147	Shivani Nanda	Asst. Professor
148	Raj Kumar Mohanta	Asst. Professor
149	Rakesh Kumar Ray	Asst. Professor
150	Shreela Dash	Asst. Professor
151	Nilamadhab Dash	Asst. Professor
152	Mamata P Wagh	Asst. Professor
153	Debaraj Rana	Asst. Professor
154	Dr. Prasanta Kumar Mohanty	Professor
155	Dr. Smita Mishra Panda	Professor
156	Dr. Susanta Kumar Mishra	Professor
157	Dr. Umakanta Nayak	Associate Professor
158	Dr. Pramod Kumar Patjoshi	Associate Professor
159	Dr. Bibhunandini Das	Associate Professor

160	Dr. Bhavyadeep Bhatia	Associate Professor
161	Dr. Ambika Sankar Mishra	Associate Professor
162	Dr. Madhumita Das	Asst. Professor
163	Dr. Sisir Ranjan Dash	Asst. Professor
164	Dr. Sabyasachi Dey	Asst. Professor
165	Dr. Girija Nandini	Asst. Professor



Dr. Prasanta Ku. Mohanty
Dean Academic



Prof. KVD Prakash
Dean - IIE & HRD