Metocean Science and Engineering

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Overview

Metocean research will be described. This includes phase resolving and spectral modelling of the waves, wave influences in the atmospheric boundary layer and in the upper ocean ocean, remote sensing of waves and wave climate, extreme Metocean environments from Tropical Cyclones to the Arctic and Southern Ocean.

Role of the waves as a link between the ocean and atmosphere will be discussed. It is rapidly becoming clear that many large-scale geophysical processes are essentially coupled with the surface waves, and those include weather, tropical cyclones, climate and other phenomena in the atmosphere, at air/sea and sea/land interface, and many issues of the upper-ocean mixing below the surface. Besides, the wind-wave climate itself experiences large-scale trends and fluctuations, and can serve as an indicator for changes in the weather climate. In the lectures, we will discuss wave influences at the atmospheric and oceanic sides of interface at scales from oceanic turbulence to climate, on the atmospheric and oceanic sides.

This course lectures are organized under the following broad categories: Wave breaking and nonlinear dynamics of surface ocean waves; Observation based physics for spectral wave models; Sea drag and atmospheric wave boundary layer; Wave induced mixing and other upper wave-coupled influences in the upper ocean; and, Wave climate and its trends by means of satellite observations and comparison with modelling. Recent efforts on satellite measurements of wave breaking and its trends will also be outlined.

Course participants will learn these topics through lectures supplemented with real field measurements and laboratory experiments. Also case studies will be shared to stimulate research motivation of participants.

Course Information	Dates – 04th to 13th Dec, 2022 Four major modules would span about 2-3 days per module.
Modules	**Module 1.** Wave breaking and nonlinear dynamics **Module 2.** Observation-based physics for spectral wave models **Module 3.** Ocean Waves as a Link Between Atmosphere and Ocean **Module 4.** Wave climate, from global to regional
You Should Attend If...	▪ You are a Civil/Mechanical/ Marine engineer or Naval architect interested in understanding ocean waves. ▪ You are an Oceanographer or with Physics background and interested to learn theoretical basics of extreme ocean waves. ▪ You are a student or faculty from academic institution interested in learning how to initiate a course or to obtain a research theme in breaking waves. **Number of participants for the course will be limited to fifty.**
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $ 200** **Student participants : INR 2000** **Faculty participants : INR 5000** **Research Organizations : INR 5000** **Industry : INR 8000** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility.

Modes of payment: Online transfer: Click here to pay: https://elearn.nptel.ac.in/gian/	
Accommodation	The participants may be provided with hostel accommodation, depending on availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel/
Registration Procedure	Please follow the following steps for the registration: 1. Go to GIAN website (http://www.gian.iitkgp.ac.in/GREGN/index) First time users need to register and pay a one-time fee of INR 500 / 2. Enroll for the course: Metocean Science and Engineering. Once you enroll for the course, an Enrollment/Application number will be generated, and the course coordinators will be notified.

The Faculty

	Bio. Alexander V. Babanin is Professor in Ocean Engineering at the University of Melbourne, Australia. Worked as a Research Scientist in the Marine Hydrophysical Institute, as an academic In the University of New South Wales, ADFA, Canberra, The University of Adelaide, South Australia, Swinburne University of Technology, Melbourne. Areas of expertise, research and teaching, are wind-generated waves, maritime and coastal engineering, air-sea interactions, ocean turbulence and ocean dynamics, climate, environmental instrumentation and remote sensing of the ocean. These include extreme Metocean conditions, from tropical cyclones to Arctic and Antarctic environments. ~300 career total publications.
	Prof. S.A. Sannasiraj is a faculty of Department of Ocean Engineering, Indian Institute of Technology Madras. His research interest includes wave modeling, wave energy, data assimilation, dynamics of wave breaking & impact on offshore structures and Nonlinear free surface wave simulation using FEM and particle methods to simulate wave impact on vertical wall and piles. He is currently coordinating a research project on the Development a new method of regime characteristics assessment for wind and extreme wave along the Indian coast.

Course Co-ordinator

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