

Workshop on Bubble Dynamics and Acoustics Advances in Modelling, Experimentation and Marine Applications

Venue: Seminar Room, Department of Ocean Engineering and Naval Architecture, Indian Institute of Technology Kharagpur, India

Dates: 14th December 2025

Organized by the Department of Ocean Engineering and Naval Architecture, IIT Kharagpur in collaboration with international experts as part of a project supported by the ministry of education, Government of India through **Scheme for Promotion of Academic and Research Collaboration (SPARC), Phase III program.**

About the Workshop

This workshop brings together leading researchers and practitioners in bubble dynamics and acoustics, focusing on the latest advances in modelling, experimentation, and marine propulsion applications. Participants will gain insights into fundamental principles, state-of-the-art laboratory methods, and numerical techniques relevant to cavitation bubbles and their acoustic signatures.

Key Themes

- Bubble cavitation in marine propulsion
- Numerical modelling of two-phase flows (FEM & IBM)
- Bubble acoustics and laboratory demonstrations
- Cutting-edge experimental techniques

Lecture Schedule

Topic/ Lecture	Contents	no of hours
Mathematical	Modelling in bubble dynamics	6
Lecture 1 Prof. A. Bhattacharyya, IIT KGP	Introduction to bubble cavitation in marine propulsion	1
Lecture 2 Prof R. Manasseh, Swinburne University of Technology	Experimental Methods for Bubble Generation in Lab	1

Lecture 3 Prof V. Joshi, BITS Pilani	Numerical Modelling Two-Phase Flow with FEM	1
Lecture 4 Prof. J. Leontini, Swinburne University of Technology (Online)	Numerical Modelling Two-Phase Flow with IBM	1
Lecture 5 Prof R. Manasseh, Swinburne University of Technology	Introduction to bubble acoustics	1
Lecture 6 Prof S. De Choudhury, Prof R. Ghoshal, and P. Akurati, IIT KGP	Laboratory demonstration of bubble acoustics	1

Total Contact Hours: 6

Target Audience

- Graduate students, researchers, and professionals in marine engineering, fluid mechanics, and acoustics.
- Those interested in bubble dynamics, cavitation modelling, and underwater acoustics.

Learning Outcomes

- Gain fundamental and applied understanding of cavitation and bubble acoustics.
- Learn hands-on laboratory techniques for bubble generation and acoustic measurements.
- Explore advanced computational approaches for simulating two-phase flows.

References for Participants

- **Manasseh, R.** Fluid Waves. CRC Press, 2022.
- Griffith, M., **Leontini, J.** Sharp interface immersed boundary methods and their application to vortex-induced vibration of a cylinder. Journal of Fluids and Structures, 72, 38-58, 2017.
- Brennen, C.E. Cavitation and Bubble Dynamics, Cambridge University Press, 2013.
- **Prabhakar, A., Ghoshal, R.** Acoustic radiation by cavitation bubbles near solid boundaries with modified wettability, Physics of Fluids, 36 (12). 2024.
- **Prabhakar, A., Ghoshal, R.** A method for consistent cavitation bubble generation at different voltages, Review of Scientific Instruments, 94(8), 2023.
- Podbevšek, D., Lokar, Ž., Podobnikar, J., Petkovšek, R., and Dular, M. Experimental evaluation of methodologies for single transient cavitation bubble generation in liquids, Experiments in Fluids, 62 (167), 2021.



Registration

<https://forms.gle/B9PQhn6zncdtw6dT6>

Interested participants can register using the link above by the 1st week of December, 2025 for free.

Contact Information

Workshop Coordinators:

- Swapnadip De Chowdhury, Assistant Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur
- Ritwik Ghoshal, Assistant Professor, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur

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