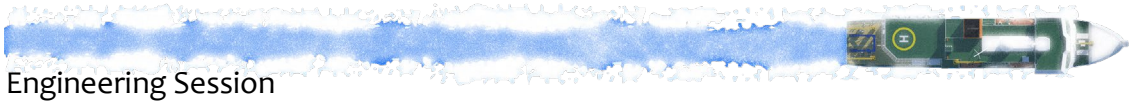
International Workshop on Arctic Ocean Observation:
Future Collaboration by Research Vessels and Icebreakers
November 17-18, 2023 @ IINO CONFERENCE CENTER, Tokyo, Japan.



Technology & Engineering Session

JAMSTEC's New Arctic Research Vessel: Advancing Arctic Engineering and International Collaboration

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Abstract

In the field of Arctic engineering, empirical data are paramount. Sea ice and icebergs, as essential parts of the cryosphere, also pose hazards to vessels, offshore structures, subsea cables/pipes and coastal infrastructure in ice prone regions. Ice is an inherently complex material, which presents challenges for modelling and has resulted in a strong reliance on empirical methods. Advances in remote sensing technology have significantly enhanced capabilities for monitoring, tracking and understanding of the ever-changing ice regime. Ground truth data to calibrate and validate such remote sensing tools and to support continued technological development are essential. The new JAMSTEC PC4 ice class Arctic Research Vessel will be equipped with state-of-the-art instrumentation for collecting ice and environmental data. This opportunity will present many exciting new possibilities for expanded Arctic research to address key knowledge gaps, collect new types of field data and foster international collaboration. This talk will share Canadian experience and explore different facets of Arctic research and engineering including:

- An overview of knowledge gaps in the Arctic engineering field. These topics include a discussion of the complexities of ice mechanics and behavior, the challenges of design for ice conditions, including common types of structures (e.g. ships, wind turbines, bridges, subsea infrastructure and offshore structures), environmental protection, cold climate materials and the development of new Arctic technology.
- An exploration of innovative ways in which Arctic research vessels can be harnessed as platforms for enhanced environmental monitoring and data collection. Such vessels serve as mobile laboratories, capable of collecting essential information on ice conditions, meteorological and oceanographic data, environmental changes, and associated phenomena. Moreover, new data are vital to provide insight into the performance of the vessel itself during operations in ice (e.g. structural response, resistance and propulsion, fuel consumption, emissions outputs, noise and vibration). These data are essential to inform updates to design codes and regulations, such as the IMO Polar Code [1-2] and ISO 19906 [3].
- A discussion of ways in which JAMSTEC's new Arctic Research Vessel can support international research collaboration. The construction of this new vessel with unique capabilities offers an exciting opportunity for collective efforts within the international community to address key knowledge gaps in Arctic Engineering. Opportunities for collaborative research projects, shared resources and data and the pooling of expertise will be explored to maximize the vessel's potential as an international research platform.

The path forward in Arctic Engineering necessitates a synergistic approach, where empirical data, technological advancements, and collaborative endeavors converge. This talk underscores the exciting role that JAMSTEC's new Arctic Research Vessel can play in fostering such endeavors. By collaborating to address crucial knowledge gaps, leverage the potential of data, and cultivate strong international research partnerships, we can develop sustainable and robust engineering solutions needed to address the challenges that lay ahead.

References

1) IMO, International code for ships operating in polar waters (Polar Code). MEPC 68/ 21/Add.1, International Maritime Organization (IMO),, London, UK, 2015.
2) IMO, Guidance on methodologies for assessing operational capabilities and limitations in ice. MSC.1/Circ.1519, In-ternational Maritime Organization (IMO), London, UK, 2016.
3) ISO, 2019. EN ISO 19906: 2019 - Petroleum and Natural Gas Industries–Arctic Offshore Structures, International Standard Organization, Geneva.