Proceedings of ASME 2023 42nd International Conference on Ocean, Offshore & Arctic Engineering

(OMAE2023)

Volume 6

June 11-16, 2023 Melbourne, Australia

Conference Sponsor Ocean, Offshore and Arctic Engineering Division

© 2023 The American Society of Mechanical Engineers, 2 Park Avenue, New York, NY 10016, USA (www.asme.org)

All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

For authorization to photocopy material for internal or personal use under those circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, tel: 978-750-8400, www.copyright.com.

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions

ISBN: 978-0-7918-8688-5

TABLE OF CONTENTS

On the Relationship Between Spectral Models of Ice Drift and Wind Turbulence	1
Towards Functional Design for the Risk Management System of Maritime Accidents in Ice-Covered Arctic Waters From Resilience Perspectives	10
Development of Ice-Load Algorithm for Real-Time Feedback During Simulator Training	17
Challenges of the Digital Transformation for Shipping: Human-Centered Design for Marine Navigation Systems Jonathan Soper, Jennifer Smith, Thomas Browne, Brian Veitch	24
ASSIST Observations 2017-2021: Uncertainty, Comparison With Sea Ice Charts, and Ice Concentration From Deep Learning Model	30
Probabilistic Methods for Estimation of the Extreme Air Temperature Along the Northern Sea Route	43
The Coupling Effects of Bubble Collapse, Ice Breaking and Structural Response	50
Impact of New Bow Shapes on FSICR Power Requirements	55
Effect of Axial Compression on Flexural Strength of Freshwater Ice	63
Multi-Particle Modelling of Compressive Ice Failure During Indentation by Rock Particles	72
Influence of Propeller-Ice Loads on the Wear Development in Stern Tube Bearings of Marine Propulsion Systems and Identification of Critical Operating Conditions	80
Verification of Inverse Propeller Moment Estimation Using a Scale Laboratory Rig: Further Results and Discussion	89
Numerical Analysis of Ice Blocks Impact on Stiffened Plates According to a Mohr-Coulomb Material and Node Splitting Technique Sungwon Yoon, Hauke Herrnring, Franciska Muller, Franz von Bock und Polach	98
Ice Resistance Prediction Using Explainable Deep Learning Method	108
Experimental and Numerical Analysis of Ice Crushing Tests With Different Shaped Ice Specimens Franciska Muller, Angelo Bohm, Hauke Herrnring, Rudiger U. Franz von Bock und Polach, Soren Ehlers	118

Numerical Simulation of an Aluminium Panel Subject to Ice Impact Load Using a Rate and Pressure Dependent Elastoplastic Material Model for Ice	130
Mojtaba Mokhtari, Ekaterina Kim, Jorgen Amdahl	150
On Wear Thickness of Rust Layers of Steel Structure due to Ice Impact Load	138
Erosion-Corrosion of Steel Structure Caused by Friction of Sea Ice Based on Simple Experiment and Theory	144
Shinji Kioka, Takahiro Takeuchi	
Ice-Induced Frequency Lock-in Vibration Analysis of Bottom Fixed Wind Turbine Structure	152
Numerical Simulation of a Ship Advancing in Pack Ice Area Based on CFD-DEM Method	159
Review on Feasibility of Bottom-Fixed Offshore Wind Development in the Arctic Focusing on Icing Problems	166
Yingjie Gu, Muk Chen Ong, Marek Jan Janocha, Atle Blomgren	100
A Statistical Approach for Estimating Sea Ice Thickness	176
An Investigation of the Influence of Added Mass on the Ice Loads in Various Sea States	185
Empirical Mode Decomposition for Noise Detection and Filtration of Ice-Induced Load Measurements.	192
Mikko Suominen, Ahmad BahooToroody, Osiris Valdez Banda	
A Numerical Simulation Tool of Ship Navigation in Ice Under Various Ice Conditions	198
Spatial Distribution Characteristics of Ice Pressure Loads Under Turning Operations in Level Ice	205
Numerical Assessment of Novel Ice Breaking Technology	215
Probable Ice Impact Locations and Magnitudes on a Naval Hull Form in Forward Transit Through Marginal Ice Zones	224
Edward Bryson, Bruce W. T. Quinton, Claude Daley	
Using Non-Linear Finite Element Analysis to Analyze the Effects of Connection Designs on the Ice Strength of a Vessel	234
Joshua Gosse, Bruce Quinton, Claude Daley, Andrew Kendrick, James Bond	
A Preliminary Investigation of Risk Control Options for Maritime Accidents in Arctic Waters	244

Author Index