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CROATIAN ACADEMY OF SCIENCES AND ARTS

RAZRED ZA TEHNIČKE ZNANOSTI

ima čast pozvati Vas na predavanje dopisnog člana HAZU

profesora emeritusa Odda Magnusa Faltinsena

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Hidroelastičnost pomorskih konstrukcija
(Hidroelasticity of marine structures)

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Predavanje će biti na engleskom jeziku.

Ulaz je slobodan za sve zainteresirane.

Tajnik Razreda za tehničke znanosti

Akademik Ignac Lovrek

Hydroelasticity of marine structures

Abstract

Applications are for ships, wind energy, solar islands, aquaculture and ultralong floating bridges. Both net cages and closed cages as well as operational conditions for well boats at net cages are discussed. Snap loads and sloshing are factors for net cages and closed cages, respectively. The influence of fish is examined. Accidental ship collisions are considered. Slamming on ships and other marine structures causes local and global hydroelastic effects. Detailed hydrodynamics can be complicated involving, e.g., nonlinear free-surface effects, gas cushions, cavitation, acoustics and thermodynamics. What matters for hydroelastic response is the time duration of the loading relative to important structural natural periods. Considering this fact enables one to simplify the hydrodynamic problem. Slamming associated with sloshing in prismatic LNG tanks is challenging involving plunging breaking waves and flip-through in shallow-liquid conditions. Higher-order wave effects and hydroelasticity can matter in consideration of "springing" and "ringing". A case with a vertical free-surface piercing cylinder standing on the sea floor is experimentally and theoretically discussed. The current can by changing the wavelength significantly influence the wave loads on stationary marine structures and thereby the global hydroelastic behavior. The current can also block the waves in opposite wave heading and current directions. The current influences also the depth decay of the secondorder sum-frequency pressure, which is a factor, e.g., for vertical resonant vibrations of a tension leg platform. It is pointed out that a realistic wind-induced current has a logarithmic profile relative to the free surface which causes challenges in model tests and by applying potential flow theory. Global challenges in the future related to the climate, pollution and the need for food and energy are discussed and linked to hydroelasticity.

Odd Magnus Faltinsen is currently a Professor Emeritus of Marine Hydrodynamics at NTNU. He has worked on broad aspects of hydrodynamics of displacement ships, high-speed craft, offshore structures and fish farms including the effect of hydroelasticity. He has developed an educational program in marine hydrodynamics at NTNU, Trondheim and made "analytical and practical contributions to the innovative analysis of wave loads and resulting motions of ships and offshore structures" (National Academy of Engineering, USA).

He has educated 60 PhD. Faltinsen is the author of the three textbooks Sea loads on Ships and Offshore Structures, Hydrodynamics of High-Speed Marine Vehicles, Sloshing (co-authored with A. N. Timokha) published by Cambridge University Press. He has authored more than 500 publications in scientific journals, conferences and books, and given a significant number of keynote and honours lectures.

Faltinsen was born in 1944 in Stavanger, Norway, and obtained a cand. real. degree in applied mathematics at the University of Bergen in 1968 and a PhD degree in Naval Architecture and Marine Engineering in 1971 at the University of Michigan. He was employed by DNV from 1968 to 1974, was dosent in marine technology from 1974 to 1976 and professor of Marine Hydrodynamics from 1976 at NTNU. He was project leader of the Growth Point Centre on Hydroelasticity at NTH/SINTEF (1991 – 1996) and the Strong Point Centre on Hydroelasticity at NTNU/SINTEF (1997-2001). He was key scientist at the Centre of Excellence on Ship and Ocean Structures (CeSOS), NTNU (2002-2012) and was a Senior Scientific Advisor at the Centre of Excellence on Autonomous Marine Operations and System (AMOS), NTNU from 2013. He was visiting professor 3 times 1-year periods at MIT, USA and 3-month periods at the Research Institute of Applied Mechanics, Kyushu University, Japan and INSEAN, Rome, Italy. He is an honorary professor at Harbin Engineering University and was an Academic Master at Dalian University of Technology.

Faltinsen is one of the founders of the international conferences on Behavior of Offshore structures (BOSS), Fast Sea Transportation (FAST), Hydroelasticity in Marine Technology and has in addition been chairman of the international conferences PRADS (Practical Design in

Shipbuilding) and ONR Symposium on Naval Hydrodynamics. He is Editor-In-Chief of Journal of Hydrodynamics. Faltinsen has been member of five International Towing Tank Conferences (ITTC) committees including two as chairperson, and three International Ship Structure Committees (ISSC).

He gave the 15th Georg Weinblum Lecture, 1992-1993 and Third Annual Honors Lecture, The Offshore Technology Research Centre, College Station and Austin, Texas; 1993. He received the Fridtjof Nansen's award for outstanding research in science and medicine in 2011. The 26th International Workshop on Water Waves and Floating Bodies held in Athens on April 17-20, 2011 was dedicated to Professor Odd M. Faltinsen for his "lifetime scientific achievements". The "Professor Odd Faltinsen Honoring Symposium on Marine Hydrodynamics" was arranged at OMAE 2013, Nantes, France in June 9-14, 2013. He received the OOAE Division-ASME Lifetime Achievement Award in "grateful recognition of significant lifetime contributions to marine and offshore hydrodynamics" in June 2013 and the Sobena International Award in 2014. He is the presenter of 2016 Wallace Lecture at MIT. Faltinsen is elected member of Norwegian Academy for Technical Sciences, Norwegian Academy of Science and Letters, The Royal Norwegian Society of Sciences and Letters, corresponding member of Croatian Academy of Sciences and Arts, foreign member of the National Academy of Engineering, USA and the Chinese Academy of Engineering.