挪威 NTNU 大学 Odd Faltinsen 教授学术报告

报告题目：Sloshing

时　间：2016 年 5 月 27 日（星期五），上午 9:30

地　点：上海交大闵行校区木兰船建楼 A1002 会议室

报告人：Professor Odd Magnus Faltinsen, Centre for Autonomous Marine Operations and Systems (AMOS), Norwegian University of Science and Technology

报告内容简介：

Resonant liquid motion (sloshing) occurs in Tuned Liquid Dampers in tall buildings, harbors, oil-gas separators on floating platforms, on-shore tanks due to earthquake, completely filled fabric structures in waves, tank vehicles with partially filled tanks, fuel tanks in space applications and gas cavities. Focus is on ship tank applications where free-surface nonlinearities are dominant and cause multi-branched solutions, wave regimes, instabilities and chaos depending on filling depth, excitation frequency and amplitude. Furthermore, free-surface nonlinearities cause swirling in spherical tanks, vertical circular tanks and prismatic tanks with length-to-breadth ratio close to one. Experiments, CFD and analytical methods are referred to in the presentation. The multimodal method, which assumes irrotational flow of an incompressible liquid, has been essential in explaining the global nonlinear liquid behavior. The method is derived by transforming the sloshing problem to a set of nonlinear ordinary differential equations by Bateman-Luke variational formulation. The linear version is used to predict rollover of a tanker vehicle in a simple way. The needed lowest sloshing mode and natural frequency is predicted by the Rayleigh quotient with infinite-fluid horizontal dipoles as test functions. How one can reduce sloshing severity by swash bulkheads and benefit from sloshing by anti-rolling tanks are also discussed. Sloshing-induced slamming (liquid impact) is of particular concern in prismatic LNG tanks on ships. The inflow in shallow liquid condition may involve flip-through and gas cavities. Many liquid flow parameters (e.g. Froude number, Reynolds number, Euler number and cavitation number), thermodynamics and hydroelasticity must be considered. Liquid resonances inside closed fish farms and piston-mode resonance in moonpools of ships are also discussed.

报告人简介：

Odd Magnus Faltinsen was born in 1944 in Stavanger, Norway, and obtained a cand. real. in applied mathematics at the University of Bergen in 1968 and a PhD in Naval Architecture and Marine Engineering in 1971 at the University of Michigan. He has worked on broad aspects of hydrodynamics of displacement ships, high-speed craft, offshore structures and fish farms. He has been professor of Marine Hydrodynamics from 1976 at NTNU and educated 59 PhD. He is a visiting professor at University College London, honorary professor at Harbin Engineering University, Academic Master at Dalian University of Technology and has been visiting professor three 1-year periods at MIT, US. 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). Cambridge University Press has published them all. He has authored about 450 publications in scientific journals, conferences and books, and given about 50 keynote and honors lectures.

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