

## Editorial

China possesses long coastal line. China's vast area of marine territory is rich in mineral, petroleum and biological resources. To meet the demand of economic growth and energy security, we have initiated and built up an ocean petroleum industry system since 1970. Up to now, Chinese engineers are capable of designing and manufacturing jacket platforms in the coastal area as deep as 300 m. Recent pivot of the offshore oil industry and enterprises has shifted from shallow water region on the continental slope to the deep sea basin where the fixed platforms have to be substituted by compliant or floating structures. The most representative types of deep-sea structures are TLP, Semi-submarine, SPAR and FPSO. On the other hand, VLFS as an additional category especially designed for marine space utilization is regarded as a remedy of shortage in land. Obviously, it is considerably significant to restrict the motions of these structures within a certain range to guarantee normal drilling and production operations.

The structures of ocean engineering need to withstand tremendous and long-term hydrodynamic loadings in the severe marine environment. In particular, extreme storm hazards such as Hurricanes Katrina and Rita in 2005 may occur more often than ever under the background of global climate change. As a result, the most challenging issue for scientists and engineers in this field at present turns out to be the coupling of fluid-structures including hydro-elastic problems. It is almost impossible to realize self-reliant and innovative design of such kinds of structures until the foregoing crucial issues are satisfactorily resolved. Therefore, the hydrodynamic interaction has become the focus of common concern in the community of hydrodynamics and ocean engineering.

In light of this situation, eight theses on hydrodynamics of ocean engineering are selected for publication in a special issue of *SCIENCE CHINA Physics, Mechanics & Astronomy* via peer review, covering various aspects of the issue: Based on the mNLS model, the evolution of TWW is studied to elucidate the mechanism of rogue wave generation. A theoretical solution is derived to explore wave current (of exponentially decaying) interaction by using HAM. At the same time, a coupled wave-current model FVCOM is developed to simulate storm surge excited by Hurricane Katrina in the Gulf of Mexico. As for water waves occurring in a container, resonant frequencies of stratified fluid sloshing are examined to avoid the impact failure of liquid carrier in advance. Owing to probable large deformation of VLFS, people have also investigated the interaction of surface waves and a thin elastic plate of arbitrary geometry. The prediction of resonant wave amplitude in narrow gaps between multi-bodies for VLFS or side by side LNGs is greatly improved by introducing a damping force in the potential model. Horizontal motions of FPSO/FDPSO positioned by spreading mooring lines of different stiffness are calculated and measured during full-scale observations *in situ* in the South China Sea. We are very pleased to see that the authors have paid more attention to theoretical and observational work as well as computational approaches in the subject. Consequently, it is believed that the current issue provides a forum of academic exchange for experts in the field and bound to promote the breakthrough of frontier issues and facilitate the final realization of innovative design of deep-sea structures in the near future.

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