New Developments in Deep-sea Oil and Gas Resource Research from Jiangsu University of Science and Technology

CHINA, October 19, 2023 /EINPresswire.com/ -- With the continuous growth of global energy demand and the increasing depletion of onshore oil resources, people are turning their attention to the vast oceans. Deep-sea oil and gas resources are extremely abundant worldwide. Although the detection rate is relatively low, the cost of deep-sea oil and gas development is decreasing year by year with technological innovations. Deep-sea oil and gas are playing an increasingly important role in the global energy supply. According to Reuters, the oil industry is gradually shifting its focus to the deep-sea domain, with rising investments in offshore oil and gas development. It is estimated that by 2025, global investments in offshore oil and gas will exceed $200 billion. The gradual increase in water depth, from the shallow to the deep oceans, leads to a qualitative increase in oil and gas extraction difficulties. Factors, such as complex ocean currents, waves and storms, significantly influence the design and operation of oil and gas production and transportation equipment, such as offshore drilling platforms, risers, oil tankers, and Floating Production Storage and Offloading (FPSO) units. These have become hot topics in today's deep-sea engineering. To address these challenges, young scholars from Jiangsu University of Science and Technology conducted research on the aforementioned issues, and their latest findings were published in China Ocean Engineering, a leading SCI journal in the field of marine engineering in China.

With the sustainable development of marine resources, dual-platform joint operations have garnered increasing attention. These operations require minimal relative movement between the two sub-platforms. To meet this requirement, Dr. Shen Zhongxiang proposed a new hybrid mooring system. This new system ensures the safety of the platforms during operation by

reducing the number of anchor chains and the relative motion between the two sub-platforms. Compared to traditional mooring systems, it offers better stability, allowing the platform to recover stability more rapidly when faced with extreme waves, thus ensuring the safety of personnel and facilities.

Steep Wave Risers (SWRs) are emerging as a promising option for deep-sea oil and gas resource development. They offer advantages like low top tension and long fatigue life. Professor Cheng Yong conducted research on SWRs under uniform or shear flow loads, focusing on Vortex-Induced Vibration (VIV). He found that due to the flexible nature of SWRs, low-frequency and multi-modal vibrations become major components of SWR's nonlinear large deformation movement. This research can prolong the service life of SWR and reduce the cost of deep-sea oil and gas extraction.

To facilitate the efficient development and transportation of marine oil and gas resources, the utilization of Floating Liquefied Natural Gas (FLNG) platforms and Liquefied Natural Gas (LNG) transport ships has become widespread. Parallel operations are normally employed to transport LNG between these platforms and ships are employed in to minimize the traveled distance. However, it is important to note that such parallel operations may induce the so-called “gap resonance” phenomenon occurring inside the narrow gap between the FLNG platform and the LNG transport ship, thereby increasing wave loads and jeopardizing safety. Professor Gao Junliang further studied the effects of ship motions on the features of gap resonance after considering the influences of the fluid factors such as incident wave type, wave height, wave period, wave reflection and transmission. By shedding light on the mechanisms and factors that impact this resonance, his research plays a vital role in enhancing our understanding of this phenomenon.

The research conducted by these scholars tackles crucial technical challenges in the extraction and transportation of deep-sea oil and gas, offering robust support for the safe and efficient exploitation of offshore resources.

Jiangsu University of Science and Technology stands as one of China's leading universities, showcasing its distinguished expertise in maritime-related disciplines through its strong emphasis on practical application. The university is home to three post-doctoral research stations, five doctoral degree authorization points, and 25 first-level discipline master's degree authorization points. Notably, its engineering, material science, and chemistry programs have ranked within the top 1% of the global Essential Science Indicators (ESI). This year holds special significance for the university as it celebrates its 90th anniversary since establishment. With a focus on marine engineering, the institution drives cross-disciplinary collaboration in shipbuilding, machinery, electronics, materials, and management. It plays a pivotal role in nurturing a wealth of exceptional marine engineering talents. Noteworthy accomplishments include significant advancements in the research and development of major national marine engineering equipment. This includes pioneering work on deep-sea space stations, super-large marine floating structures, seventh-generation ultra-deepwater semi-submersible drilling

platforms, offshore oil and gas development equipment, and offshore wind power technology. Moreover, the university has carved distinct niche in various realms, such as large offshore floating platforms, underwater robots, marine energy utilization, marine ecology and environmental monitoring, underwater acoustics, underwater information security, and deep-sea mining. These achievements underscore the university's commitment to noteworthy contributions to the field.

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