Journal of Offshore Mechanics and Arctic Engineering

Editorial

Profiles of Two JOMAE Associate Editors (A Continuing Series)

Since its inaugural issue in 1987, the *ASME Journal of Offshore Mechanics and Arctic Engineering* has been a mainstay in its support of original peer-reviewed research that advances the state of knowledge on all aspects of analysis, design, and technology development in the ocean, offshore, arctic, and related fields. The journal's goals are to provide a forum for timely and in-depth exchanges of scientific and technical information among researchers and engineers. It emphasizes fundamental research and development studies as well as review articles that offer either retrospective insights on well-established topics or exposures to innovative or novel developments.

In Editorials [1,2] that appeared in the June 2020 and August 2020 issues of the journal, I noted and will remind readers again that it is the dedication of an international team of associate editors, each with his or her own individual expertise in different areas, which keeps the journal vibrant and ensures quality in the dissemination of knowledge in the field. The journal today has 36 associate editors who cover the breadth of areas in offshore mechanics and arctic engineering; they represent 13 countries, namely, Brazil, Canada, China, Denmark, Finland, Germany, India, Italy, Japan, Norway, Singapore, the United States, and the United Kingdom. These associate editors and the many hard-working reviewers who support them make the journal what it is. In this issue, I continue the series where my goal is to acknowledge the contributions of a couple of associate editors each time, highlighting their expertise areas and accomplishments. In this issue, I present to you two associate editors—Dr. Luis V. S. Sagrilo, a professor of Civil Engineering at the Center for Post-Graduate Studies in Engineering (COPPE) at the Federal University of Rio de Janeiro (UFRJ) in Brazil, and Dr. Sheng Bao, an associate professor of Civil Engineering at Zhejiang University in China.

Associate Editor, Dr. Luis V. S. Sagrilo

Dr. Luis V. S. Sagrilo (Fig. 1), D.Sc. (1994), is a full professor in the Civil Engineering Department (PEC) at the Center for Post-Graduate Studies in Engineering (COPPE), part of the Federal University of Rio de Janeiro (UFRJ) in Brazil. He was a co-founder and is now the head of the Laboratory of Analysis and Reliability of Offshore Structures (LACEO/COPPE). He studied at the Federal University of Santa Maria (UFSM) in Brazil, where, in 1986, he obtained the degree of Civil Engineer. From 1987 to 1994, he studied at COPPE/UFRJ where he got his master's and doctorate degrees in Civil Engineering with a focus on offshore structures. From 1994 to 2006, before starting as a faculty member, Prof. Sagrilo worked at PEC-COPPE/UFRJ as a researcher developing industry-sponsored projects related to the analysis of offshore structures. In 2009–2010, he spent 6 months as a visiting researcher with CeSOS (Centre for Ships and Ocean Structures) at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. To date, he has supervised 12 doctoral candidates to completion of their degrees, eight others are under his current supervision; additionally, 45 Master's theses have been successfully completed under his supervision.

Currently, Prof. Sagrilo's research interests are directed toward structural reliability analysis, extreme and fatigue analysis, and the development of surrogate models (as artificial neural networks) for complex stochastic dynamic analysis—all applied in the analysis of new and existing offshore structures, including fixed platforms, FPSO hulls, and flexible as well as steel risers and mooring lines. To date, he has supervised more than 200 industry-sponsored research and technological projects, covering the aforementioned topics; most of these projects have been sponsored by the Brazilian state-owned oil company, Petrobras.

Prof. Sagrilo has published as many as 150 technical publications in peer-reviewed conferences and journals. Currently, he is also a co-coordinator of the technical sessions on Risers and Moorings Reliability, part of the Structures, Safety, and Reliability Symposium at the ASME Annual OMAE Conferences. He serves as a reviewer for several journals in the field.

Fig. 1 Dr. Luis V. S. Sagrilo

Fig. 2 Dr. Sheng Bao

Fig. 3 Magnetic measurement instrument and experimental setup with strain gage installation and internal pressure measurement (based on the work of Dr. Sheng Bao)

In Prof. Sagrilo's words: "Being used to more conventional urban building structural design, the very first time I heard about design of offshore structures, I became fascinated with the topic mainly because, besides functional loads, it involves environmental loads due to waves, wind and current. Few structures on earth present such complexity in structural design. Moreover, I realized that robust design procedures for such structures required the understanding of the random nature of environmental loads. Then, I started working in this area and have never stopped." Nowadays, he is focused on the development of advanced and more efficient numerical analysis procedures for marine structures, mainly those in deep waters for oil production, and his work addresses problems such as how to properly account for different wave sources (sea and swell waves) in design. One of his main concerns these days, which he passes on to his students and others in his team at LACEO, is how to always think of practical uses of any new technique being developed.

Associate Editor, Dr. Sheng Bao

Dr. Sheng Bao (Fig. 2) is an associate professor of Civil Engineering at Zhejiang University in China. He received his Ph.D. in Structural Engineering in 2007 from the Illinois Institute of Technology in Chicago. After graduation, he worked as a structural engineer with Thornton Tomasetti in Chicago and was involved in the design of the 600-m tall building, the Chicago Spire. He returned to China in 2008 and has been a faculty member at Zhejiang University ever since. He has supervised more than 20 Ph.D. and Master's students. Prof. Bao has published more than 70 journal articles and conference papers. His research interests include pipeline inspection, integrity assessment, and fatigue testing. His main interest is focused on non-destructive testing (NDT) based on piezomagnetic effects. Piezomagnetism refers to changes in the intrinsic magnetization of a material subjected to mechanical actions such as tension or compression. Piezomagnetic effects are due to interactions between the mechanical and magnetic mesostructure of materials. Microplastic processes that alter the arrangement of the ferromagnetic domain structure affect the intensity of the associated magnetic fields. The progressive degradation of such ferromagnetic materials can be tracked by following the evolution of the piezomagnetic field. This NDT method based on piezomagnetic fields can be used in corrosion inspection, fatigue damage evaluation, and weld defect detection.

One of Dr. Bao's projects, working with an energy company, was to carry out inspections and remaining strength analysis of corroded pipelines using the piezomagnetic effect. Dr. Bao and his students developed a piezomagnetic tool (as shown in Fig. 3) to record magnetic fields along the pipeline as it was being pressurized internally. A software tool was developed to analyze abnormal variations of the magnetic fields at the defect locations and to assess defect sizes. The team established correlations between the magnetic field and the defect size. The remaining strength of the pipeline can be evaluated by analysis of the magnetic parameters.

Subsea pipelines and offshore structures are often installed in corrosive environments and experience complex loading conditions. As a result of the aging of these pipelines and structures, it is increasingly important to be able to perform non-destructive inspections and evaluations of the existing facilities. However, up to now, there have been very few effective NDT methods available to assess the conditions of these structures. Commonly used NDT technologies for inspection, such as magnetic flux leakage testing (MFL) and ultrasonic testing (UT), have limitations due to their high cost or stringent requirements in the testing. Research studies are needed to improve existing NDT technologies and develop new tools to improve the integrity assessment of existing pipelines and structures. Dr. Bao believes that the NDT method he has developed based on piezomagnetic fields offers a promising technology with the advantages of easy operation, early damage detection, and stress sensitivity. Further work may be focused on improving the accuracy and trying out more field applications.

Lance Manuel
Editor-in-Chief,
Department of Civil, Architectural and Environmental Engineering,
The University of Texas at Austin,
Austin, TX 78712
e-mail: lmanuel@mail.utexas.edu

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