



# **Dynamics and Control of Mechanical Systems in Offshore Engineering (Advances in Industrial Control)**

*Wei He, Shuzhi Sam Ge, Bernard Voon Ee How, Yoo Sang Choo*

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*Dynamics and Control of Mechanical Systems in Offshore Engineering* is a comprehensive treatment of marine mechanical systems (MMS) involved in processes of great importance such as oil drilling and mineral recovery. Ranging from nonlinear dynamic modeling and stability analysis of flexible riser systems, through advanced control design for an installation system with a single rigid payload attached by thrusters, to robust adaptive control for mooring systems, it is an authoritative reference on the dynamics and control of MMS. Readers will gain not only a complete picture of MMS at the system level, but also a better understanding of the technical considerations involved and solutions to problems that commonly arise from dealing with them.

The text provides:

- a complete framework of dynamical analysis and control design for marine mechanical systems;
- new results on the dynamical analysis of riser, mooring and installation systems together with a general modeling method for a class of MMS;
- a general method and strategy for realizing the control objectives of marine systems with guaranteed stability the effectiveness of which is illustrated by extensive numerical simulation; and
- approximation-based control schemes using neural networks for installation of subsea structures with attached thrusters in the presence of time-varying environmental disturbances and parametric uncertainties.

Most of the results presented are analytical with repeatable design algorithms with proven closed-loop stability and performance analysis of the proposed controllers is rigorous and detailed.

*Dynamics and Control of Mechanical Systems in Offshore Engineering* is primarily intended for researchers and engineers in the system and control community, but graduate students studying control and marine engineering will also find it a useful resource as will practitioners working on the design, running or maintenance of offshore platforms.

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