Editorial

Ship Dynamics

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More than a century-and-half ago, William Froude and his son Robert [1,2] conducted the first scientifically designed towing tank experiments using scaled ship models travelling in calm water and waves. Since then, advances in mathematics and technology led to the development of various methods for the assessment of the dynamic behavior of ships. Today it is recognized that continuous improvement of direct assessment methods validated by model experiments or full-scale measurements are the doctrine of naval architecture. Yet, as we enter the 2nd decade of the 21st Century the advent of goal-based regulations and the emergence of safe and sustainable shipping standards still confront our ability to understand the fundamentals and assure absolute ship safety in design and operations.

To instigate renewed interest on the well-rehearsed subject of ship dynamics, this Special Issue presents a collection of 12 high-quality research contributions with a focus on the prediction and analysis of the dynamic behavior of ships in a stochastic environment. The papers presented are co-authored by leading academics and practitioners from Europe, the Far East and USA. The contributions discuss recent developments on:

- Ship wave loads in confused seas, including nonlinear effects [3], steady state hydroelastic responses [4], sloshing [5] and slamming [6].
- Dynamic coupling and resonant phenomena associated with seakeeping performance of ships in wind and waves [5,7].
- Ship maneuvering in level ice, waves and open water conditions [8–11].
- Dynamic stability in waves [12,13].
- Ship energy efficiency in abrupt wave conditions [14].

The methods presented use combined knowledge from theoretical hydrodynamics, computational aero/hydrodynamics, fluid/structural dynamics and their interactions, as well as results from model tests and full-scale measurements. Strong emphasis is attributed on understanding nonlinearities and flow dissipation associated with stochastic responses in confused seas.

Based on these independent contributions it may be concluded that contemporary developments will be influenced by new science at the interface of multifield problems and the implementation of improved design criteria in advanced decision support systems. We therefore hope that this Special Issue will renew the interest of academics, practitioners and regulators in their pursuit to push forward ship science, technical services and safety standards of relevance.

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