

NEEDS AND CHALLENGES IN MODEL TESTING OF WAVE AND TIDAL ENERGY DEVICES

Raju Datla, Stevens Institute of Technology, USA
rdatla@stevens.edu

Michael DeLorme, Stevens Institute of Technology, USA

Uihoon Chung, Stevens Institute of Technology, USA

Lei Zuo, Virginia Techn, USA

Muhammad Hajj, Stevens Institute of Technology, USA

Key Words: Wave Energy Converters; Model Testing; Scaling Laws; Power Take Off

Evaluation of the viability of wave and tidal energy converters represent the main challenge for marine energy developers and government agencies. Although the concept of wave energy conversion is very intuitive, its performance evaluation is complicated by different factors including evaluation of efficiency, components performance and maintenance costs. These factors do not scale up directly from lab experiments. Testing at 1/100 or smaller ratios cannot resolve critical details or satisfy required dynamic similarities. Full-scale testing is expensive. Additionally, varying the designs may not be an option. This implies a need for testing at larger scales. In controlled tests at 1/50 or larger scales, WEC responses can be determined to the point where they can be scaled up and modes of failure can be assessed. This presentation discusses dynamic similarity, scaling laws and how these can be applied to wave and tidal energy devices. Test methodologies, standards and specialized instrumentation, understanding and interpretation of results will also be discussed. The presentation is based on knowledge gained from tests conducted on numerous scale model hull forms and marine platforms in the towing/wave tank of the Davidson Laboratory that have resulted in military full-scale prototypes and commercial systems.

