

# Department of Ocean & Resources Engineering

## *Seminar*

### MODELING OF HURRICANE WAVES IN HAWAIIAN WATERS USING WAM

by

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## **Abstract**

This study investigates the application of WAve Model (WAM) to simulate the generation and propagation of hurricane waves in Hawaiian waters. The model solves the energy balance equations for wave growth based on wind energy input, and simulates the spatial and time evolution of wave spectra. Although WAM has been extensively validated and used in various global and regional wave forecast models, its application to simulate hurricane waves has not been investigated thoroughly.

Crucial to the application of WAM in hurricane wave modeling is accurate input of wind data and adequate resolution of the wind structure. This study compares and analyzes several commonly used hurricane wind models and their applications in WAM against measured wind and wave data for Hurricane Iniki, which directly hit the Hawaiian Island of Kaua'i in 1992. These wind models include a simple Rankine vortex, a modified Rankine vortex, the Holland model, and a simple parametric wind model utilized in the storm surge project SLOSH. The input to these models includes the storm track, central pressure, and radius of maximum wind speed. Iniki was a relatively small but very intense hurricane. Its compact wind structure provides a critical test case to examine the required directional, frequency and spatial resolution in WAM for modeling hurricane waves.

The final product of this study is a high-resolution regional WAM for the Hawaiian islands. The model can be used to generate design data based on hypothetical or historical events for planning purposes or to predict coastal wave conditions prior to the arrival of storms for emergency management.