Engineering With Nature Project Fact Sheet

Wave Attenuation in Vegetation

Development of a Frequency Dependent Dissipation Model for Spectral Wave Numerical Models

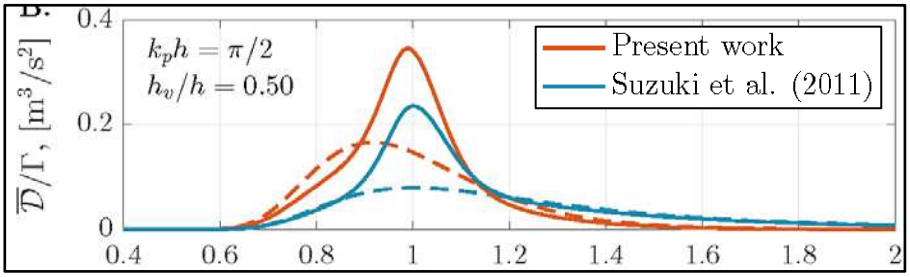
Background

The bottom friction dissipation in spectral wave models (SWAN, MIKE SW, STWAVE, etc.) is commonly frequency dependent, while the dissipation due to vegetation only partially accounts for the frequency of the various wave components. For the bottom friction term, the shorter waves may locally be in deep water conditions, while the longer waves are in intermediate to shallow water conditions. Consequently, there exists a cut-off frequency above which the dissipation due to bottom friction vanishes. This cut-off frequency is also applicable to dissipation from submerged vegetation canopies.

Artificial Vegetation used in Anderson and Smith (2014)

Objectives

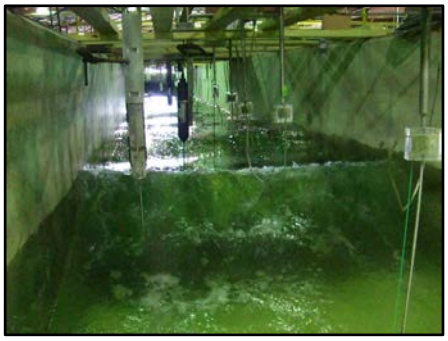
The objective is to develop a new frequency distributed dissipation model to improve the accuracy of wave attenuation in canopies in spectral models.



Frequency Distribution of Energy Dissipation

Approach

The new model will derived analytically, and then applied to experimental data for validation. The experimental data from Anderson and Smith (2014) will be used, and a follow-on set of experiments at the University of Aberdeen will be conducted. The experiments at the University of Aberdeen will focus on wave attenuation with artificial vegetation with a range of submergence.



Waves and Submerged Vegetation in Anderson and Smith (2014) facility

Outcomes

Outcomes from this project include a new wave energy dissipation model that can be universally implemented into numerical spectral wave models (SWAN, MIKE SW, STWAVE, etc.). This new model will be detailed in a journal paper.

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