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Vegetation Hydrodynamics for Climate Adaptation and Mitigation

Heidi Nepf

Professor of Civil and Environmental Engineering

Massachusetts Institute of Technology

ABSTRACT:

Coastal ecosystems, such as seagrass and salt marsh, diminish the impact of storms on coastal communities. They also sequester carbon more rapidly than terrestrial forests. Because of these attributes, coastal vegetation is considered an integral part of climate mitigation and adaptation. Predicting the value of these ecosystems with regard to coastal protection and/ blue carbon credit requires models for the interaction of fluid motion with flexible vegetation. This talk describes scaling laws to predict the drag on individual plants, and the extension of these laws to predicted wave decay over a meadow of plants. Plant reconfiguration and drag are functions of Cauchy number (ratio of drag and restoring force due to plant rigidity) and the ratio of wave excursion to plant height. Combining with other models, the prediction of wave dissipation can be used to estimate the minimum meadow length-scale needed to eliminate wave-driven sediment resuspension, a critical metric for restoration success and carbon retention.

BIOGRAPHY:

Dr. Nepf received her doctorate from Stanford University (1992) and was a Postdoctoral Fellow at Woods Hole Oceanographic Institution before beginning her career at MIT in 1993. She is internationally known for her work on the impact of vegetation on currents, waves, and sediment transport. The Nepf Lab develops models for the physical processes that determine how vegetated habitats, such as seagrass, marsh, kelp, and mangrove, provide coastal protection, impact landscape stability, improve water quality, and provide blue carbon reservoirs.