

The XXXIV International School of Hydraulics, 11-14 May 2015, Żelechów, Poland

Vegetation Hydrodynamics at the Blade-Scale and the Canopy-Scale

Heidi M. NEPF

Department of Civil and Environmental Engineering, Massachusetts Institute of Technology
Cambridge, MA 02139, USA

ABSTRACT

For over a century vegetation has been removed from channels and coastal zones to facilitate navigation and development. In recent decades, however, we have recognized the ecologic and economic benefits of aquatic vegetation. It buffers against coastal eutrophication, damps waves and coastal storm surge, provides habitat, inhibits bank erosion, and provides significant carbon storage. The management of watersheds and coastal zones has turned from vegetation removal to restoration. The ecosystem services provided by vegetation depend on plant-flow interactions that mediate nutrient fluxes, sediment transport, and the damping of waves and currents. In the first part of the talk, I will discuss plant-flow interaction at the blade-scale, which is relevant to the uptake of nutrients and the blade-scale drag. In the second part of the talk I will describe flow at the canopy scale, focusing on the shear-layer that forms at the top of a meadow and how its structure dictates turbulence and transport within the canopy.