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**High resolution simulations of turbulent flows in open-channels**[1]

THORSTEN STOESSER, Georgia Institute of Technology

The results of recent high resolution large-eddy simulations (LES) of selected turbulent open channel flows are presented and discussed. An efficient, finite volume based Navier-Stokes solver is employed to simulate the flow over a rough bed and through idealized emergent vegetation. The fluid phase is solved entirely on a Cartesian grid and different immersed boundary methods (IMB) are used to account for the solid, non-Cartesian roughness elements. First and second order statistics are compared to measurements and the accuracy of the different IMBs is assessed. The frequency of turbulence events (like sweeps, ejections) and their contribution to Reynolds stresses is quantified and the anisotropy of turbulence is described. Based on the turbulence statistics, the utilization of structures eduction methods and aided by visualizations and animations the generation and fate of the dominating coherent structures in the flows is discussed.

[1]In collaboration with S.B. Bomminayuni, Georgia Institute of Technology.