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**Direct simulation of the flow over a porous layer of large porosity**
PANAGIOTIS-DIMITRIOS ANTONIADIS, MILTIADIS V. PAPALEXANDRIS, Universite Catholique de Louvain — In this talk we report on direct numerical simulations of constant-density flow over and through a layer of a porous medium with large porosity. Initially the fluid is at rest and the flow is driven by a constant pressure gradient. Periodic boundary conditions are used along the streamwise direction, whereas no-slip conditions are specified on the bottom boundary which also coincides with the lower end of the porous strip. Further, outflow conditions are imposed on the top boundary of the computational domain, which is located sufficiently far from the porous medium. As the flow evolves, a boundary layer is formed on the lower end of the porous strip and an additional transition zone is formed right above its upper end. Due to the steep velocity gradients across this zone, a Kelvin-Helmholtz instability is onset which leads to the formation of a mixing layer. We present and analyze the characteristics of vortex pairing and growth rate of this mixing layer. Finally, we discuss the results of a parametric study with respect to the porosity of the medium.

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