Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

On the dynamics of shear layers formed on the interface between a porous strip and a clear fluid PANAGIOTIS-DIMITRIOS ANTONIADIS, MILTIADIS V. PAPALEXANDRIS, Universite catholique de Louvain — In this talk we present results from 2D and 3D simulations of a temporally-evolving shear layer that is developed on the interface between a porous strip of large porosity and a clear fluid. The simulations are based on a single set of governing equations, valid for both inside and outside the porous layer, that does not require additional conditions on the interface. These equations are integrated via a predictor-corrector, projection-based scheme on a collocated grid. According to our study, the evolution of the shear layer can be divided in 4 phases. The first one is characterised by the onset of the Kelvin-Helmholtz instability, whereas in the second, the layer's momentum thickness grows according to the square-root of time law. The third phase is marked by roll-up and formation of vortices that extend to the interior of the porous medium; nonetheless the spatially-averaged velocities remain self-similar. In the fourth phase, the growth rate is much higher and the flow eventually experiences a transition to turbulence. Our talk concludes with results from a parametric study with respect to the porosity of the porous strip.

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Date submitted: 09 Jul 2012 Electronic form version 1.4