Analysis of the Flow at the Interface of a Porous Media

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Abstract. The influence of inserting a ceramic foam in a pipe with a 1:4 sudden expansion was numerical investigated. The foam, with a thickness to diameter ratio of 0.60, was positioned at different distances from the sudden pipe expansion wall. Three different porosities were analyzed (10, 20 and 60 pores per inch) for pore Reynolds numbers in the range of 20-400, corresponding to pipe Reynolds numbers of 2400 to 22000 in the pipe section upstream the sudden expansion. Predictions of the sudden pipe expansion cavity assuming laminar flow within the foam yield the penetration of the separated flow region into the foam. Considering turbulent flow in the porous foam and the model of Pedras and Lemos [J. Fluids Eng.-T. ASME **123**, 941 (2001)] prevents this penetration. The numerical and physical models used could not reproduce completely the foam influence on the separated turbulent flow region between the sudden pipe expansion and the foam inlet.