Experimental and numerical characterization of the transverse dispersion at the exit of a short ceramic foam inside a pipe

by

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Abstract

The paper theoretically and numerically describes and experimentally studies transverse dispersion of a passive tracer in highly porous ceramic foams of different pore sizes. The pore Reynolds numbers range from 10 to 300. Digital images of the dispersion patterns were recorded and an approximate transverse dispersion coefficient was determined. Numerical solutions of the steady fluid flow and scalar concentrations confirm that the transverse dispersion coefficient models, based on the assumption of dominance of mechanical dispersion and on the linear dependence of the transverse dispersion model on *ud*, are able to predict satisfactorily the dispersion of a tracer for the range of Reynolds numbers considered. An alternative derivation of this linear dependence based on the closure of the volume averaged scalar transport equation is also presented. The influence of the length of the porous media in the stream direction on transversal and longitudinal dispersion is consistent with findings for packed beds at much lower Peclet and Reynolds numbers.

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