Abstract Submitted
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Dispersive and mixing characteristics for turbulent porous media flows based on local length and time scale measurements[1] JAMES LIBURDY, VISHAL PATIL, Oregon State University — Porous media flows have a very wide range of applications, both in engineering applications and natural flows. Local mixing and dispersion is strongly influenced by the complex pore geometry. Understanding mixing properties requires knowledge of the range of scales present within the flow and how they vary with Reynolds number. Experiments have been conducted using time resolved two component PIV based on refractive index matching of the solid and liquid phases. The flow characteristics vary over a large range of Reynolds numbers, typically based on an average pore velocity and hydraulic diameter or bead size as the characteristic length. In this study we examine the effect of increased pore Reynolds number on the turbulence characteristics for Reynolds numbers from approximately 400 to 4000. In particular the integral and Kolmogorov length scales are estimated, along with the determination of the integral velocity and Eulerian time scales. These are then used to estimate the Lagrangian time scale. The asymptotic behavior associated with increasing pore Reynolds number is shown, and used to evaluate the scaling relationships. Results are also used to demonstrate the evaluation of the mechanical dispersion coefficient and that it compares well with results obtained using global methods such as solute breakthrough curves.

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