

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Flow Intermittency, Dispersion, and Correlated Continuous Time Random Walks in Porous Media PIETRO DE ANNA, MIT, Cambridge (MA, USA), TANGUY LE BORGNE, Universite de Rennes 1, (France), MARCO DENTZ, IDAEA-CSIC, Barcelona (Spain), ALEXANDRE TARTAKOVSKY, PNNL, Richland (WA, USA), DIOGO BOLSTER, University of Notre Dame, South Bend (IN, USA), PHILIPPE DAVY, Universite de Rennes 1, (France) — We study the intermittency of fluid velocities in porous media and its relation to anomalous dispersion. The complexity of the pore scale flow arises from the heterogeneous medium structure that induces non-Gaussian velocity distributions, which can lead to a persistent non-Fickian dispersion. Lagrangian velocities measured at equidistant points along streamlines are shown to form a spatial Markov process. As a consequence of this remarkable property, the dispersion of fluid particles can be described by a continuous time random walk with correlated temporal increments. This new dynamical picture of intermittency provides a direct link between the microscale flow, its intermittent properties, and non-Fickian dispersion.

Pietro de Anna
MIT

Date submitted: 30 Jul 2013

Electronic form version 1.4