

Abstract Submitted
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Dead-end sites and their influence on anomalous transport in porous media ANKUR BORDOLOI, DAVID SCHEIDWEILER, PIETRO DE ANNA, University of Lausanne — Structural heterogeneity plays a crucial role in the complex transport of species in various porous media, such as subsurface soil and aquifers. Such heterogeneity may occur due to non-uniformity in the sizes or the shapes of grains that comprise the medium. Dead-end sites refer to cavity-like spaces in concave grain-boundaries that appear intermittently through a porous medium. Using microfluidic experiment and numerical simulation, we investigate the velocity fields of colloidal suspensions inside a model heterogenous porous structure. We characterize the porous structure via image processing and isolate dead-end sites from the remaining pore spaces. The study reveals complex flow structures inside dead-end sites that contribute to the small-scale velocity. The velocity within the dead-end sites follow a power law distribution that relate to the distribution of trapped volumes inside these sites through the entire medium. Further, we show that the presence of these sites strongly influences the breakthrough curve and the anomalous transport of colloidal beads in this system.

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