

”A Fractional PDE Approach to Turbulent Mixing; Part I: an Anomalous Transport Theory”

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

A Fractional PDE Approach to Turbulent Mixing; Part II: Numerical Simulation MEHDI SAMIEE¹, MOHSEN ZAYERNOURI², Michigan State Univ — We propose a generalizing fractional order transport model of advection-diffusion kind with fractional time- and space-derivatives, governing the evolution of passive scalar turbulence. This approach allows one to incorporate the nonlocal and memory effects in the underlying anomalous diffusion i.e., *sub-to-standard* diffusion to model the trapping of particles inside the eddied, and *super-diffusion* associated with the sudden jumps of particles from one coherent region to another. For this nonlocal model, we develop a high order numerical (spectral) method in addition to a fast solver, examined in the context of some canonical problems.

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Date submitted: 31 Jul 2016

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