THEORETICAL PHYSICS SEMINAR CIRCUIT

S N BOSE NATIONAL CENTRE FOR BASIC SCIENCES
SALT LAKE, KOLKATA 700 106

NOTICE FOR SEMINAR

Title

Clustering, intermittency and scaling for passive particles on fluctuating surfaces

Speaker: Dr. Tapas Singha

Postdoctoral Fellow, TIFR Centre for Interdisciplinary Sciences, TIFR-Hyderabad

Date: 28th November 2018

Time: 4:00 pm

Venue: Fermion Hall

Abstract

I will talk about a scaling approach which successfully characterizes clustering and intermittency in space and time, in systems of noninteracting particles driven by fluctuating surfaces. We study both the steady state and the approach to it, for passive particles sliding on one-dimensional Edwards-Wilkinson or Kardar-Parisi-Zhang (KPZ) surfaces, with particles moving either along (advection) or against (antiadvection) the growth direction. Numerical simulations are supplemented by analytical results for a sticky slider model in which particles coalesce when they meet. Results for single particle displacement versus time show to what extent particle dynamics is slaved to the surface, while scaling properties of the probability distribution of the separation of two particles determine the scaling form of average overlap of a pair of trajectories. For the many-particle system, clustering in steady state is studied via moments of particle number fluctuations in a single stretch, revealing different degrees of spatial multiscaling with different drivings. Temporal intermittency in steady state is established by showing that the scaled flatness diverges as the stretch size scaled by system size approaches zero for all the three drivings, but with different exponents, reflecting strongest clustering for KPZ advection and weakest for KPZ antiadvection. Finally we consider the approach to the steady state, study both the flatness and the evolution of equal-time correlation functions as in coarsening of phase ordering systems. Our studies give clear evidence for a simple scaling description of the approach to steady state, with the scale set by a length which grows in time. An investigation of aging properties reveals that flatness is nonmonotonic in time with two distinct branches, and that a scaling description holds for each one.

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