Cornell University Library

We gratefully acknowledge supp
the Simons Fo
and member ins

arXiv.org > math > arXiv:1106.1596

Search or Article-id

(Help | Advance

All papers

Mathematics > Probability

The Kardar-Parisi-Zhang equation and universality class

Ivan Corwin

Brownian motion is a continuum scaling limit for a wide class of random processes, and there has been great success in developing a theory for its properties (such as distribution functions or regularity) and expanding the breadth of its universality class. Over the past twenty five years a new universality class has emerged to describe a host of important physical and probabilistic models (including one dimensional interface growth processes, interacting particle systems and polymers in random environments) which display characteristic, though unusual, scalings and new statistics. This class is called the Kardar-Parisi-Zhang (KPZ) universality class and underlying it is, again, a continuum object -- a non-linear stochastic partial differential equation -- known as the KPZ equation. The purpose of this survey is to explain the context for, as well as the content of a number of mathematical breakthroughs which have culminated in the derivation of the exact formula for the distribution function of the KPZ equation started with {\it narrow wedge} initial data. In particular we emphasize three topics: (1) The approximation of the KPZ equation through the weakly asymmetric simple exclusion process; (2) The derivation of the exact one-point distribution of the solution to the KPZ equation with narrow wedge initial data; (3) Connections with directed polymers in random media. As the purpose of this article is to survey and review, we make precise statements but provide only heuristic arguments with indications of the technical complexities necessary to make such arguments mathematically rigorous.

Which authors of this paper are endorsers?