Patrick Dondl

Pinning and depinning of interfaces in random media

We consider the evolution of an interface, modeled by a parabolic equation, in a random environment. The randomness is given by a distribution of smooth obstacles of random strength. To provide a barrier for the moving interface, we construct a positive, steady state supersolution. This construction depends on the existence, after rescaling, of a Lipschitz hypersurface separating the domain into a top and a bottom part, consisting of boxes that contain at least one obstacle of sufficient strength. We prove this percolation result. Furthermore, we examine the question of existence of a solution propagating with positive velocity in a random field with non-bounded random obstacle strength. This work shows the emergence of a rate independent hysteresis in systems subject to a viscous microscopic evolution law through the interaction with a random environment.