Non-equilibrium steady states: a non-perturbative renormalisation group approach

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Simple models such as reaction-diffusion processes or Langevin equations, stand as important building blocks to investigate non-equilibrium scaling phenomena and phase transitions between non-equilibrium steady states. Yet their theoretical understanding is often thwarted by the presence of strong-coupling regimes and the lack of controlled analytical tools to treat them. I will show that non-perturbative renormalisation group methods, developped in the '90 by Wetterich and Morris, turn out to be a powerful technique to study these models, even in their strong-coupling phases. I will first review results obtained for branching and annihilating random walks, showing that one can reach genuinely non-perturbative fixed points [1-3]. I will then focus on kinetic roughening, specifically on the KPZ equation, and present recent progress on the study of its strong-coupling rough phase [4].

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