Poster 9

Depinning free of the elastic approximation

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We model the isotropic depinning transition of a domain-wall using a two dimensional Ginzburg-Landau scalar field instead of a directed elastic string in a random media. An exact algorithm accurately targets both the critical depinning field and the critical configuration for each sample. For random bond disorder of weak strength Δ, the critical field scales as $\Delta^{4/3}$ in agreement with the predictions for the quenched Edwards-Wilkinson elastic model. However, critical configurations display overhangs beyond a characteristic length $l_0 \sim \Delta^{-\alpha}$, with $\alpha \approx 2.2$, indicating a finite-size crossover. At the large scales, overhangs recover the orientational symmetry which is broken by directed elastic interfaces. We obtain quenched Edwards-Wilkinson exponents below l_0 and invasion percolation depinning exponents above l_0. A full picture of domain wall isotropic depinning in two dimensions is hence proposed.