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Temperature-induced crossovers in the static roughness of a one-dimensional interface[1] ELISABETH AGORITSAS, DPMC-MaNEP - University of Geneva (Switzerland), VIVIEN LECOMTE, Laboratoire de Probabilite et Modeles Aleatoires, University Paris Diderot (France), THIERRY GIAMARCHI, DPMC-MaNEP - University of Geneva (Switzerland) — At finite temperature and in presence of disorder, a one-dimensional elastic interface displays different scaling regimes at small and large lengthscales. Using a replica approach and a Gaussian variational method (GVM), we explore the consequences of a finite interface width ξ on its small-lengthscale geometrical fluctuations. We compute analytically the static roughness $B(r)$ of the interface as a function of the distance r between two points on the interface, in the specific case of short-range elasticity and random-bond disorder. We find that for a finite ξ two temperature regimes exist, and we determine the corresponding different roughness regimes and their crossover lengthscales. In addition, using a directed polymer description, we study via a second GVM procedure and generic scaling arguments, a modified toy model that provides further insight on those results, which apply to experimental interfaces such as e.g. ferromagnetic domain walls in thin films, subjected to a quenched uncorrelated disorder.

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