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Successively Thresholded Domain Boundary Roughening Driven by Pinning Centers and Missing Bonds: Hard-Spin Mean-Field Theory Applied to d=3 Ising Magnets TOLGA CAGLAR, Sabanci University, A. NIHAT BERKER, Sabanci University and MIT — Hard-spin mean-field theory has recently been applied to Ising magnets, correctly yielding the absence and presence of an interface roughening transition respectively in $d = 2$ and $d = 3$ dimensions and producing the ordering-roughening phase diagram for isotropic and anisotropic systems. The approach has now been extended to the effects of quenched random pinning centers and missing bonds on the interface of isotropic and anisotropic Ising models in $d = 3$ [1]. We find that these frozen impurities cause domain boundary roughening that exhibits consecutive thresholding transitions as a function of interaction anisotropy. For both missing-bond and pinning-center impurities, for moderately large values of the anisotropy, the systems saturate to the "solid-on-solid" limit, exhibiting a single universal curve for the domain boundary width as a function of impurity concentration.

[1] T. Caglar, A.N. Berker, arXiv:1509.01910 [cond-mat.stat-mech]

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