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NONPERTURBATIVE RENORMALIZATION GROUP FOR THE KARDAR-PARISI-ZHANG EQUATION

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Abstract:

We investigate the strong-coupling regime of the stationary Kardar-Parisi-Zhang equation for interfaces growing on a substrate of dimension d=1, 2, and 3 using a nonperturbative renormalization group (NPRG) approach. We compute critical exponents, correlation and response functions, extract the related scaling functions and calculate universal amplitude ratios. We work with a simplified implementation of the second-order (in the response field) approximation proposed in a previous work [PRE 84, 061128 (2011) and Erratum 86, 019904 (2012)], which greatly simplifies the frequency sector of the NPRG flow equations, while keeping a nontrivial frequency dependence for the 2-point functions. The one-dimensional scaling function obtained within this approach compares very accurately with the scaling function obtained from the full second-order NPRG equations and with the exact scaling function. Furthermore, the approach is easily applicable to higher dimensions and we provide scaling functions and amplitude ratios in d=2 and d=3. We argue that our ansatz is reliable up to d \simeq 3.5.