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Cross-over to Mean Field Behavior in Small-World Nanomaterials XINGJUN ZHANG, M.A. NOVOTNY, T. DUBREUS, Physics and ERC CCS; Mississippi State University — Recently the suggestion was made to include small-world network effects into nanoscale materials [1,2]. Small-world connections lead to (slightly modified) mean-field behavior of model systems [3]. Consequently there is the possibility for a new class of nanomaterials governed by the mean-field fixed point. Here we describe finite-scale scaling investigations of ferromagnetic Ising models adding small-world connections to either $d = 1$ or $d = 2$ lattices with V sites. In particular, we demonstrate how finite- size scaling works by scaling with a 'length' given by the logarithm of V rather than a linear dimension of the system. Results are compared to studies of a related model with dilute long-range interactions [4].
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Xingjun Zhang
Mississippi State Univeristy

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