

Abstract Submitted  
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**Renormalization Group Approaches for Dynamics on Irregular Networks** MADHURIMA NATH, Department of Physics, NDSSL, Virginia Tech , YIHUI REN, NDSSL, Virginia Tech, STEPHEN EUBANK, Department of Physics, NDSSL, Department of Population Health Sciences, Virginia Tech — Moore and Shannon's reliability polynomial can be used as a global statistic to explore the behaviour of a diffusive process on a network that represents a finite sized interacting system. It depends on both the network topology and the dynamics of the process and gives the probability that the system has a particular desired property. The estimation of the reliability polynomials for large graphs is feasible using Monte-Carlo simulation. By analogy with the partition function of a physical system, it is possible to define renormalization group approaches that map the parameters of one network onto another keeping the network reliability invariant. This transformation suggests a canonical form for the network reliability that can be used as a measure for non - random structure for different graphs. Further, this information about the existence of certain structured patterns provides knowledge about the community structures in the network.

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