



Mathematical Physics

# Motif based hierarchical random graphs: structural properties and critical points of an Ising model

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A class of random graphs is introduced and studied. The graphs are constructed in an algorithmic way from five motifs which were found in [Milo R., Shen-Orr S., Itzkovitz S., Kashtan N., Chklovskii D., Alon U., Science, 2002, 298, 824-827]. The construction scheme resembles that used in [Hinczewski M., A. Nihat Berker, Phys. Rev. E, 2006, 73, 066126], according to which the short-range bonds are non-random, whereas the long-range bonds appear independently with the same probability. A number of structural properties of the graphs have been described, among which there are degree distributions, clustering, amenability, small-world property. For one of the motifs, the critical point of the Ising model defined on the corresponding graph has been studied.

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