Abstract Submitted
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Monte-Carlo simulations for two-stage percolation transition of the enhanced trees TAKEHISA HASEGAWA, TOMOAKI NOGAWA, The University of Tokyo — We investigate the bond percolation problem on the enhanced binary tree (EBT). The EBT is given by adding intra-generation links to the binary tree. The EBT belongs to the class of *nonamenable graphs* (NAGs), and percolations on NAGs are predicted to show two-stage transition through three distinct phases according to open bond probability p; (i) *nonpercolating phase*: there is no infinite cluster for $0 \leq p < p_{c1}$, (ii) *intermediate phase*: there are infinitely many infinite clusters for $p_{c1} < p < p_{c2}$, and (iii) *percolating phase*: there is a unique infinite cluster for $p_{c2} < p \leq 1$. In this talk, we perform Monte-Carlo simulations to study the bond percolation on the EBT [1]. Our numerical results actually show that the system has two different percolation thresholds p_{c1} and p_{c2}. By performing finite size scaling for the cluster size distributions, we confirm that all the points in the intermediate phase are critical. This fact leads that there exist infinitely many infinite clusters in the intermediate phase. In this phase the corresponding fractal exponent continuously increases with p from zero to unity. We also show that the first transition at p_{c1} is of second order in mean field universality class, while order parameter rises discontinuously at p_{c2}.
[1] T. Nogawa and T.Hasegawa; cond-mat/0810.1602

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