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Robustness of interdependent networks under targeted attack XUQING HUANG, Center for Polymer Studies and Department of Physics, Boston University, JIANXI GAO, Department of Automation, Shanghai Jiao Tong University, SERGEY BULDYREV, Department of Physics, Yeshiva University, SHLOMO HAVLIN, Minerva Center and Department of Physics, Bar-Ilan University, H. EU-GENE STANLEY, Center for Polymer Studies and Department of Physics, Boston University — When an initial failure of nodes occurs in interdependent networks, a cascade of failure between the networks occurs. Earlier studies focused on random initial failures. Here we study the robustness of interdependent networks under targeted attack on high or low degree nodes. We introduce a general technique which maps the targeted-attack problem in interdependent networks to the random-attack problem in a transformed pair of interdependent networks. We find that when the highly connected nodes are protected and have lower probability to fail, in contrast to single scale-free (SF) networks where the percolation threshold $p_c = 0$, coupled SF networks are significantly more vulnerable with p_c significantly larger than zero. The result implies that interdependent networks are difficult to defend by strategies such as protecting the high degree nodes that have been found useful to significantly improve robustness of single networks.

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