Cascading failures in interdependent lattice networks: from first order to second order phase transition

WEI LI, Center for Polymer Studies and Department of Physics, Boston University, Boston, MA 02215 USA, AMIR BASHAN, Department of Physics, Bar-Ilan University, Ramat-Gan 52900, Israel, SERGEY BULDYREV, Department of Physics, Yeshiva University, 500 West 185th Street, New York, New York 10033, USA, EUGENE STANLEY, Center for Polymer Studies and Department of Physics, Boston University, Boston, MA 02215 USA, SHLOMO HAVLIN, Department of Physics, Bar-Ilan University, Ramat-Gan 52900, Israel — We study a system composed of two interdependent lattice networks A and B, where nodes in network A depend on a node within a certain shuffling distance \( r \) of its corresponding counterpart in network B and vice versa. We find, using numerical simulation that percolation in the two interdependent lattice networks system shows that for small \( r \) the phase transition is second order while for larger \( r \) it is a first order.

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