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Cascading failures in Europe's transmission system[1] ANDREA ASZTALOS, SAMEET SREENIVASAN, BOLESLAW SZYMANSKI, G. KORNISS, Rensselaer Polytechnic Institute — Cascading failures constitute an important vulnerability of infrastructure networks, hence understanding the origin and propagation of these failures is of great interest. To this end, we study cascades of overload failures within the framework of the cascade model introduced by Motter and Lai (2002) applied for flows that have a distributed character. We investigate numerically the properties of these failures in the high-voltage European electric power transmission system from 2002 (Zhou and Bialek, 2005). The network consists of 1254 nodes (substations) specified by geographical locations, and 1812 links (transmission lines) that are assumed to be undirected. We find that assigning excess capacities in proportion to initial loads does not significantly mitigate cascading failures. Moreover, increasing the fractional excess capacity does not yield monotonically increasing gains. Using a simple model of spatial network - random geometric graph - we investigate methods beyond the proportional excess capacity allocation in order to improve the gains in mitigating such failures.

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