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Network-theoretical approach to partitioning of real power grids IBRAHIM ABOU HAMAD, BRETT ISRAELS, SVETLANA V. POROSEVA, PER ARNE RIKVOLD, Florida State University — Modern societies depend critically on their electrical power grids. It is, therefore, essential to understand the grid's large-scale behavior in order to improve its resilience against catastrophic damage. A key factor determining the grid's large-scale behavior is its topology. In particular, an important question is whether a grid topology can be efficiently partitioned into independent communities ("islands") of densely connected vertices (generators, substations, consumers) that are more loosely connected to other communities. Such partitioning can be utilized either to strengthen the grid by introducing new connections, or to achieve "Intentional Intelligent Islanding" by installing control devices in a minimal number of links in order to contain cascading failures to a limited region. Here we report on the performance of several network-partitioning algorithms, both agglomerative and spectral-based divisive, in applications to real power grids, including the high-voltage grids of Florida and Italy.

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