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Monte Carlo optimization of a matrix-based power-grid islanding algorithm IBRAHIM ABOU HAMAD, PER ARNE RIKVOLD, Physics Department, Florida State University, SVETLANA V. POROSEVA, Mechanical Engineering Department, University of New Mexico — Spectral matrix methods are widely used for intelligent intentional islanding of power grids, the purposeful partitioning of a utility system to limit cascading disturbances. However, these methods may produce unbalanced islands of generators and loads when applied recursively. While some of the resulting islands have surplus generating capacity, others are deficient. We here implement a Monte Carlo simulated-annealing optimization procedure to load-balance the islands and increase their internal connectivity or modularity. After a matrix-based initial agglomeration of nearby loads and generators, Monte Carlo is used to redistribute loads among neighboring islands. The resulting network of islands is treated as a new network with the first-generation islands as the new nodes ("supergenerators" and "superloads"), and the same agglomeration and MC procedures are iteratively applied. We show here that combining matrix-based agglomeration and Monte Carlo methods results in well balanced, internally connected islands.

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