

Calculating methods for the marginal steady-state modes and identifying weak links of electric power system.

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In the design and operation of electric power systems (EPS) one of the major challenges is the marginal steady-state modes calculation. The matters of formulation and application of the generalized marginal mode equations (MME) for solving the problems of EPS static stability are considered. Algorithms for EPS sensor nodes determining based on the spectrum analysis of the conductance matrix and singular value decomposition of the Jacobi matrix are presented. Methodology for specifying the EPS links which are weak in terms of the static aperiodic stability based on the calculation of union Jacobi matrix elements of the steady-state mode equations with MME application has been developed. It was demonstrated, that application of the EPS weak link identifying methodology allows to develop measures of the mode effective introduction into the admissible domain as well as making informed decisions on optimizing EPS structure at the design stage.

Key words: electric power system, marginal steady-state modes, Jacobi matrix, sensory node, weak links.