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Summary: The present study is concerned with irregular state forms in essentially nonlinear dynamic networks/systems for the analysis of which special algorithms and methods are applied. For the engineering-scientific treatment of electrotechnical problems, the methods and algorithms basing on the Poincaré map (global steady-state analysis, topological representation), on the power density spectrum and on the concept of the Lyapunov exponent have proved highly efficient. The application of these simulation techniques is demonstrated in the global analysis of an externally excited oscillator network and in the setting up of design criteria for cryomicroelectronic voltage standards on the basis of the Josephson effect.

MSC:

93C15 Control/observation systems governed by ordinary differential equations
90C35 Programming involving graphs or networks
65C20 Probabilistic models, generic numerical methods in probability and statistics
93C10 Nonlinear systems in control theory

Keywords:

irregular state forms; nonlinear dynamic networks; global steady-state analysis; Lyapunov exponent