Quasi-Stationarity of Electric Power Grid Dynamics Based on a Spatially Embedded Kuramoto Model

Abstract:
A novel and simple network model that is capable to reproduce quasi-stationary behavior and propagation phenomena in electric power grid dynamics is introduced. A new Kuramoto approximation to distributed generator dynamics is obtained from combining a continuous spatial interaction function with a discrete lattice model representing generator positions and network structure over a continuous spatial domain. At hand of model properties and a numerical study quasi-stationarity of electric power grid dynamics results, being related to non-vanishing fluctuation and oscillations in stationary state.

Stichworte:
Discrete lattices; Distributed generators; Electric power grids; Kuramoto models; Model properties; Network structures; Quasi-stationarity; Quasi-stationary; Simple networks; Spatial interaction; Stationary state

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