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电力系统

基于实测信号的电力系统低频振荡模态辨识

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摘要：

广域相量测量系统的应用为基于量测的电力系统稳定性分析提供了有力支持。基于动态量测信息准确地辨识电力系统低频振荡模态参数及振型，对提高电力系统低频振荡的实时监测与控制至关重要。结合经验模态分解与随机子空间辨识算法，基于发电机有功功率的动态量测信息，开展了电力系统低频振荡辨识与分析的研究。该方法能够在较短的时间从含噪信号内提取原系统真实准确的振荡信息，同时能够得到各振荡模式相应的振型，有效地克服Prony算法和自回归滑动平均算法受噪声、系统实际阶数的影响大，以及单一随机子空间辨识算法难以处理非线性、非平稳振荡信号的缺点。测试系统及仿真结果验证了该方法在电力系统低频振荡分析中的可行性。

关键词：

Mode Identification of Power System Low-Frequency Oscillation Based on Measured Signal

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Abstract:

Application of wide area measurement system (WAMS) provides strong support to measurement-based power system stability analysis, so it is of great importance for the improvement of real-time monitoring and control of power system low-frequency oscillation to well and truly identify oscillation modals and oscillation parameters based on the information from dynamic measurement. Combining empirical mode decomposition (EMD) with stochastic subspace identification (SSI) algorithm and according to the dynamically measured information of generator active power, the identification and analysis on power system low frequency are researched. The proposed method can effectively overcome the defect that Prony algorithm and auto-regressive and moving average (ARMA) algorithm are apt to be influenced by noise and actual order number of the system as well as the shortcoming that it is difficult for single stochastic subspace to deal with nonlinear and non-stationary oscillation signals, thus the proposed method can truly and accurately extract original oscillation information from the signals, which contain noise, in a shorter time period, meanwhile corresponding oscillation modals of various low-frequency oscillation modes can be obtained. The feasibility of applying the proposed method to the analysis on power system low-frequency oscillation is verified by both results from testing system and simulation.

Keywords:

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