

国家重点基础研究项目

基于ARMA模型的低频振荡模式在线辨识技术研究

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**摘要:** 为提高电力系统低频振荡实时监测的水平, 在讨论基于自回归滑动平均模型(auto-regressive moving-average, ARMA)及广域实测类噪声信号的低频振荡模式辨识方法的基础上, 给出了一种基于奇异值分解的ARMA模型定阶方法; 提出了在辨识出ARMA模型参数之后采用ARMA谱估计以识别低频振荡主导模式; 最后结合工程实际提出了基于广域测量系统的低频振荡模式在线辨识框架, 主要包括: 数据预处理、基于ARMA模型及滑动窗的低频振荡模式参数追踪以及大扰动下动态响应信号的辨识策略等。通过对测试系统时域仿真以及南方电网广域实测所得的类噪声数据进行分析, 表明: 所述方法可以准确辨识低频振荡的主导模式, 特别是对于弱阻尼模式的参数辨识精度较高, 具有很高的实用意义。

**关键词:** 自回归滑动平均模型 广域测量系统 在线辨识 低频振荡 类噪声信号 主导模式

A New Approach for Online Identification of Low Frequency Oscillation Modes Based on Auto-Regressive Moving-Average Model

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**Abstract:** To improve real-time monitoring level of low frequency oscillation in power grids, on the basis of analyzing low frequency identification methods based on auto-regressive moving-average (ARMA) and wide area measured noise like signals, an order determination approach for ARMA model based on singular value decomposition is given; then it is proposed to identify the dominant mode of low frequency oscillation by ARMA spectral estimation after the parameters of ARMA model are identified; finally, combining with engineering practice, a wide area measurement system (WAMS) based on-line identification framework for low frequency oscillation modes is put forward, which mainly composes of data preprocessing, parameter tracking of low frequency oscillation mode based on ARMA model and sliding window, and identification strategy of dynamic response signals under large disturbance, etc. By means of time-domain simulation of testing system and the analysis on noise like data measured in China Southern Power Grid by WAMS, it is indicated that the proposed approach can identify the dominant mode of low frequency oscillation accurately, especially, higher parameter identification accuracy can be attained for weak-damping mode, so the proposed approach is practicable.

**Keywords:** auto-regressive moving-average (ARMA); wide area measurement system online identification low frequency oscillation noise like signal dominant mode

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