

新能源与分布式发电

基于改进小波神经网络的光伏发电系统非线性模型辨识

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摘要:

将光伏发电系统看成基于气象参数的非线性黑箱模型, 用非线性自回归外推模型对不同天气条件下的光伏发电系统进行辨识。采用了对系统维数不敏感的基于方差分析展开的改进小波神经网络对系统进行非线性自回归外推模型辨识, 辨识数据和验证数据均取自实际光伏发电系统。实例研究表明: 与Sigmoid网络函数法、树分割法及基本小波神经网络法相比, 基于改进小波神经网络的非线性自回归外推模型能更好地反应各种不同天气条件下光伏发电系统的动态行为; 天气波动的剧烈程度对辨识效果影响较大。

关键词: 光伏发电系统 非线性自回归外推 模型辨识 改进小波神经网络 方差分析

Nonlinear Model Identification for Photovoltaic System Using Modified Wavelet Neural Network

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Abstract:

Regarding photovoltaic (PV) generation system as a nonlinear black box model based on meteorological parameters, the PV generation system under different weather conditions is identified by nonlinear autoregressive exogenous (NARX) model. The modified wavelet neural network (WNN) insensitive to system dimension, which is expanded by variance analysis, is used to identify PV generation system by NARX model, and both identification data and the validating data are taken from actual PV generation system. Case study results show that the modified WNN based NARX model can reflect dynamic behavior of PV generation system under different whether conditions better than Sigmoid network function, partition tree method and basic WNN, and the results also show that the identification effect is affected significantly by the weather fluctuation.

Keywords: photovoltaic generation system nonlinear autoregressive exogenous model identification modified wavelet neural network analysis of variance

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