新能源与分布式发电

风电场风速分布特性的模式分析

彭虎，郭钰锋，王松岩，于继来

哈尔滨工业大学 电气工程及自动化学院，黑龙江省 哈尔滨市 150001

摘要：

目前的风电场风速分布特性分析主要服务于风电场规划或电能计划，通常由较长时间内的风速采样数据统计得到。然而，当需要应对更短时间、特别是与运行和控制时间级有关的问题时，服务于规划或电能计划的风电场风速分布特性已不能完全适应新的需要。从不同的应用环境出发，探讨了风电场风速分布特性的模式化差异及可能造成模式化差异的主要原因，并从风速概率密度和条件风速概率密度分布中提取出特征风速、形状系数、尺度系数、概率偏度等指标，以考察不同风速分布所表现出的模式差异性。某实际风电场风速分布特征分析结果表明：从不同角度统计的分布特性存在明显的模式差异性；风速分布特性用于解决不同问题时，需要采用与其对应的统计规律。

关键词：

Pattern Analysis on Characteristics of Wind Speed Distribution in Wind Farms

PENG Hu, GUO Yufeng, WANG Songyan, YU Jilai

School of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin 150001, Heilongjiang Province, China

Abstract:

At present the analysis on the characteristics of wind speed distribution, which is generally obtained from the statistic of sampled wind speed data, is mainly serviced to the wind farm planning or electric energy planning. However, the characteristics of wind speed distribution serviced to above-mentioned planning fields cannot fully cope with the demands under new conditions, such as the characteristics of wind speed distribution in shorter time periods, especially in those short time periods related to the operation and control of power grid. Based on different application environments, the patternized differences of characteristics of wind speed distribution in wind farm and main causes that may lead to the patternized differences are discussed, and from the probability density of wind speed as well as from the probability density distribution of conditional wind speed the indices, such as characteristic wind speed, shape factor, scale coefficient and probability deviation and so on, are extracted to observe and study the patternized differences due to different wind speed distribution. Results of analysis on characteristics of wind speed distribution in an actual wind farm show that there are evident patternized differences among the characteristics of wind speed distribution from the statistic based on different viewpoints; when characteristics of wind speed distribution is applied to solve different problems, it is necessary to choose the statistical law conforming to the problem.

Keywords:

通讯作者: 彭虎

作者简介:
作者Email: phu315@126.com

参考文献：

[1] Mark L A，Robert M Z．The role of wind forecasting in grid operations & reliability[C]．IEEE/PES Transmission and Distribution Conference & Exhibition：Asia and Pacific，Dalian，China，2005． [2]

韩爽．风电场功率短期预测方法研究[D]．保定：华北电力大学，2008．　[3] Chen Z，Blaabjerg F．Wind farm：a power source in future power systems[J]．Renewable and Sustainable Energy Reviews，2009 (13)：1288-1300．　[4] 杜颖，卢继平，李青，等．基于最小二乘支持向量机的风电场短期风速预测[J]．电网技术，2008，32(15)：62-66．　Du Ying，Lu Jiping，Li Qing，et al．Short-term wind speed forecasting of wind farm based on least square-support vector machine[J]．Power System Technology，2008，32 (15)：62-66(in Chinese)．　[5] 蔡凯，谭伦农，李春林，等．时间序列与神经网络法相结合的短期风速预测 [J]．电网技术，2008，32(8)：82-85．　Cai Kai，Tan Lunnong，Li Chunlin，et al．Short-term wind speed forecasting combing time series and neural network method[J]．Power System Technology，2008，32(8)：82-85(in Chinese)．　[6] 杨秀媛，肖洋，陈树勇．风电场风速和发电功率预测研究[J]．中国电机工程学报．2005，25(11)：1-5．　Yang Xiuyuan，Xiao Yang，Chen Shuyong．Wind speed and generated power forecasting in wind farm[J]．Proceedings of the CSEE，2005，25(11)：1-5(in Chinese)．　[7] 潘晓春．基于矩函数的风速概率分布参数估计方法[J]．现代电力，2007，24(5)：12-18. Pan Xiaochun．Parameter estimation methods of wind speed probability distribution based on moment function[J]．Modern Electric Power，2007，24(5)：12-18(in Chinese)．　[8] 丁明，吴伟，吴红斌，等．风速概率分布参数预测及应用[J]．电网技术，2008，32(14)：10-14．　Ding Ming，Wu Wei，Wu Hongbin，et al．Research on forecasting of probabilistic distribution parameters of wind speed and its application [J]．Power System Technology，2008，32(14)：10-14(in Chinese)．　[9] 丁明，吴义纯，张立军．风电场风速概率分布参数计算方法的研究[J]．中国电机工程学报，2005，25(10)：107-110．　Ding Ming，Wu Yichun，Zhang Lijun．Study on the algorithm to the probabilistic distribution parameters of wind speed in wind farms[J]．Proceedings of the CSEE，2005，25(10)：107-110(in Chinese)．　[10] Riahy G H，Abedi M．Short term wind speed forecasting for wind turbine applications using linear prediction method[J]．Renewable Energy，2008(33)：35-41．　[11] Alexiadis M C，Dokopoulos P S，Sahsamanoglou H S，et al．Short-term forecasting of wind speed and related electrical power[J]．Solar Energy，1998，63(1)：61-68．　[12] Ma Lei，Luan Shiyan，Jiang Chuanwen，et al．A review on the forecasting of wind speed and generated power[J]．Renewable and Sustainable Energy Reviews，2009(13)：915-920．　[13] Thanasis G B，John B T，Minas C A，et al．Long-term wind speed and power forecasting using local recurrent neural network models[J]．IEEE Trans on Energy Conversion，2006，21(1)：273-284．　[14] 李常春．风资源评估方法研究[D]．呼和浩特：内蒙古工业大学，2006．　[15] 张节潭，程浩忠，黄微，等．含风电场的电源规划综述[J]．电力系统及其自动化学报，2009，21(2)：35-41. Zhang Jietan，Cheng Haozhong，Huang Wei，et al．Review of generation expansion planning for power system with wind farms[J]．Proceedings of the CSU-EPSA，2009，21(2)：35-41(in Chinese)． [16] Seyit A A，Dinler A．A new method to estimate Weibull parameters for wind energy applications [J]．Energy Conversion and Management，2009(50)：1761-1766.

本刊中的类似文章