

基于 SCADA 数据的风电机组发电机健康状况评估

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摘要: 发电机是风电机组中的关键部件, 然而由于运行环境的复杂多变, 发电机出现故障的概率往往较高。本文提出了一种基于 SCADA 数据的发电机健康状况的评估方法。该方法主要包括特征选择、健康基准模型、在线健康评估三部分。首先针对特征选择问题, 结合专家经验并充分考虑状态参数间的相关性, 构建合理的状态特征向量。其次在构建健康基准模型时, 充分利用相关的多维状态信息, 采用发电机健康运行时的数据建立基于高斯混合模型 (GMM) 的健康基准模型。最后在线健康评估时, 设计了一种基于马氏距离的健康衰退指标用于评判发电机的健康状况。将上述方法应用到 2016 年上海电气某风场的 SCADA 数据中, 结果表明, 该方法不仅可以准确地跟踪发电机运行状态的变化过程, 还起到了很好的故障早期识别作用。

关键词: 发电机; 相关性分析; 高斯混合模型; 在线健康评估

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Health Assessment of Wind Turbine Generator Based on SCADA Data

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Abstract: Generator is a key component of wind turbine. However, the probability of generator failures is often higher due to the complex and changeable operating environment. This paper presents a health assessment method of wind turbine generator based on SCADA data. The method includes three parts: feature selection, health benchmark model and online health assessment. First, for the feature selection, we give full consideration to the correlation among the state parameters and combine with expert experience to build a reasonable state feature vector. Second, The relevant multidimensional state information is fully utilized, and the data of the generator run normally are used to construct the health benchmark model based on Gaussian Mixture Model (GMM). Finally, we design a health degradation index which is used to evaluate the health status of generator based on Mahalanobis distance at the online health assessment stage. The above method is applied to the SCADA data of a wind field in Shanghai Electric Power Company in 2016. The results show that the method can not only track the change process of the generator condition accurately, but also play a good role in early fault recognition.

Key words: Generator; Correlation Analysis; Gaussian Mixture Model; Online Health Assessment

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