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非線性自回歸模型用於風能預測及風機健康監控
Nonlinear Autoregressive Exogenous Model for Wind Power Plant Modelling and Health Monitoring

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摘要

本研究將建立出風機輸出-輸入特性的數學模型，此模型除了可用於發量電預測外，亦可用於風機健康監控。本研究利用風速和輸出功率間的關聯性來找出所需風速項及延遲時間，再結合自回歸方法進一步改善輸出功率的預測準確性，並且探討不同時間尺度下本研究之誤差表現。本研究亦運用多變量分析方法中的多變量變異數分析，來檢測風機模型的參數是否有改變，進而得知風機的健康狀態來達到監控目的。

關鍵詞：風機模型建立、風能輸出預測、風機健康監控

Abstract

This research is about building a model that describes an estimated input-output property of wind turbines. This model can be used for wind power generation forecasting as well as monitoring the change of wind turbine models. The required wind speed information terms and the associated time delays are inspected through correlation analysis. Autoregressive terms are also added to further improve the overall accuracy of the model. The resultant accuracy of the proposed model is analysis under different time scale considerations. The healthiness of the wind turbine can be inspected using MANOVA analysis to justify whether the system parameters are significantly different after a possible change in wind turbine states.

Keywords: Wind Turbine Modelling, Wind Power Forecast, Wind Turbine Healthiness Monitoring