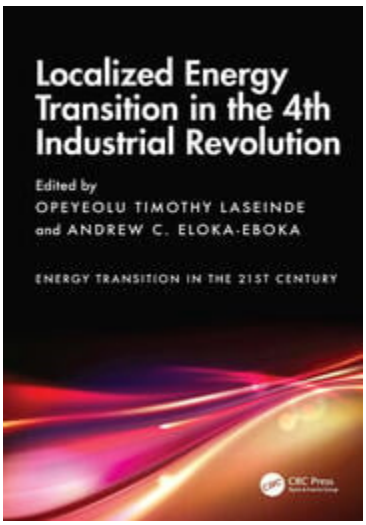
Skip to main content



Chapter

Neural Network-Based Wind Turbine Power Curve Models Using Several Wind Farms' Influencing Parameters and Topography

*By*Olayinka S. Ohunakin, Emerald U. Henry, Victor U. Ezekiel, Olaniran J. Matthew, Damola S. Adelekan, Mutali Nepfumbada

Book Localized Energy Transition in the 4th Industrial Revolution

Edition1st Edition

First Published2024

ImprintCRC Press

Pages29

eBook ISBN9781032651958

ABSTRACT

Wind turbine power curve (WTPC) modelling is of great importance for energy assessment and forecasting. In previous works, WTPC models were developed based only on wind speed. However, in this research, we developed modelling methods that represent actual WTPC by extensively considering wind farms' topography and several field conditions (other than wind speed only) that are found to influence the power output of wind turbines, such as climate variability, the effect of neighbouring wind turbines, turbulence intensity, wake effect, ambient temperature, atmospheric pressure, wind direction, and terrain conditions. We analyse the radial basis function (RBF) and multi-layer perceptron (MLP) architectures for sensitivity and modelling accuracy. A filtered dataset is passed into the models, and fitting accuracies are computed alongside sensitivity analysis. The best-performing models are compared with numerous parametric and non-parametric WTPC modelling schemes. It is found that the quantile filtering (QF-NN) models outperform all other models in terms of fitting accuracy and outperform all selected hybrid models in terms of computation time.

Previous ChapterNext Chapter

Back to Top