

# Probabilistic Forecasts of Wind Power Generation by Stochastic Differential Equation Models - DTU Orbit (08/11/2017)

## Probabilistic Forecasts of Wind Power Generation by Stochastic Differential Equation Models

The increasing penetration of wind power has resulted in larger shares of volatile sources of supply in power systems worldwide. In order to operate such systems efficiently, methods for reliable probabilistic forecasts of future wind power production are essential. It is well known that the conditional density of wind power production is highly dependent on the level of predicted wind power and prediction horizon. This paper describes a new approach for wind power forecasting based on logistic-type stochastic differential equations (SDEs). The SDE formulation allows us to calculate both state-dependent conditional uncertainties as well as correlation structures. Model estimation is performed by maximizing the likelihood of a multidimensional random vector while accounting for the correlation structure defined by the SDE formulation. We use non-parametric modelling to explore conditional correlation structures, and skewness of the predictive distributions as a function of explanatory variables.

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