



Contribution ID: 47

Type: **not specified**

## **MODELLING WIND TURBINE POWER PRODUCTION WITH FUZZY LINEAR REGRESSION METHODS**

*Wednesday, 15 September 2021 12:20 (20 minutes)*

Wind energy is an immensely popular renewable energy source, due to the increase in environmental awareness, the decrease in the number of fossil fuels, and the increase in costs. Therefore, the amount of energy produced in wind turbine farms should be estimated accurately. Although wind turbine manufacturers estimate energy production depending on wind speed and wind direction, mostly actual productions are different from these estimates. Such differences may be observed not only because of model errors or randomness, but also from uncertainty in the environment, or lack of data in the sample. In this study, energy production is estimated by using wind speed and wind direction, where either measurement errors or vagueness mostly exist. In order to deal with this disadvantage, fuzzy logic is implemented in the proposed regression models. Four different fuzzy regression models are constructed according to the fuzziness situation. Crisp (non-fuzzy) input crisp output, crisp input fuzzy output, and fuzzy input fuzzy output situations are considered, and the results are compared. Numerous fuzzy regression models are used in this study and it is concluded that fuzzy models can both suggest effective solutions where fuzziness exists, and provide more flexible estimations and decisions.

### **Keywords**

Fuzzy Logic, Fuzzy Regression, Wind Energy.

### **Special/invited session**

**Primary authors:** Mr GUNDUZ, SADIK OZKAN (HACETTEPE UNIVERSITY); Prof. TESTIK, OZLEM MUGE (HACETTEPE UNIVERSITY)

**Presenter:** Mr GUNDUZ, SADIK OZKAN (HACETTEPE UNIVERSITY)

**Session Classification:** Modelling 4

**Track Classification:** Modelling