

Open Source Library for the Simulation of Wind Power Plants

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This paper presents the new open source Modelica library WindPowerPlants. For the economic assessment of either a wind power plant or an entire wind park, the accurate prediction of the energy output is essential. Such prediction is usually performed by means of calculations based on statistical wind data. The proposed WindPowerPlants library is capable of assessing the energy output both for statistical and real wind data based on time domain simulations.

In the presented version of the library wind turbine models are modeled with pitch control. The generator models have variable speed and an optional connector to the mains. The entire library is based on power balance conditions and losses are fully neglected. Yet, the library can be extended towards more detailed models considering different types of losses.

The structure and components of the library are presented. Simulations examples are shown and compared with reference data. The applicability of the proposed WindPowerPlants library is demonstrated and possible enhancements are discussed.

The WindPowerPlants library was developed during a Diploma project at the Technical Engineering College, TGM. For the development of the library OpenModelica was used. The library is published under the Modelica2 license and available through the Modelica homepage. The main motivations for developing the presented library were:

- Investigate control mechanisms of wind power plants
- Support teaching activities in simulation
- Provide an open source library that may initiate further developments

Due to the openness of Modelica, wind power plant simulation can also be combined with electrical network aspects such as dynamics, stability, etc.

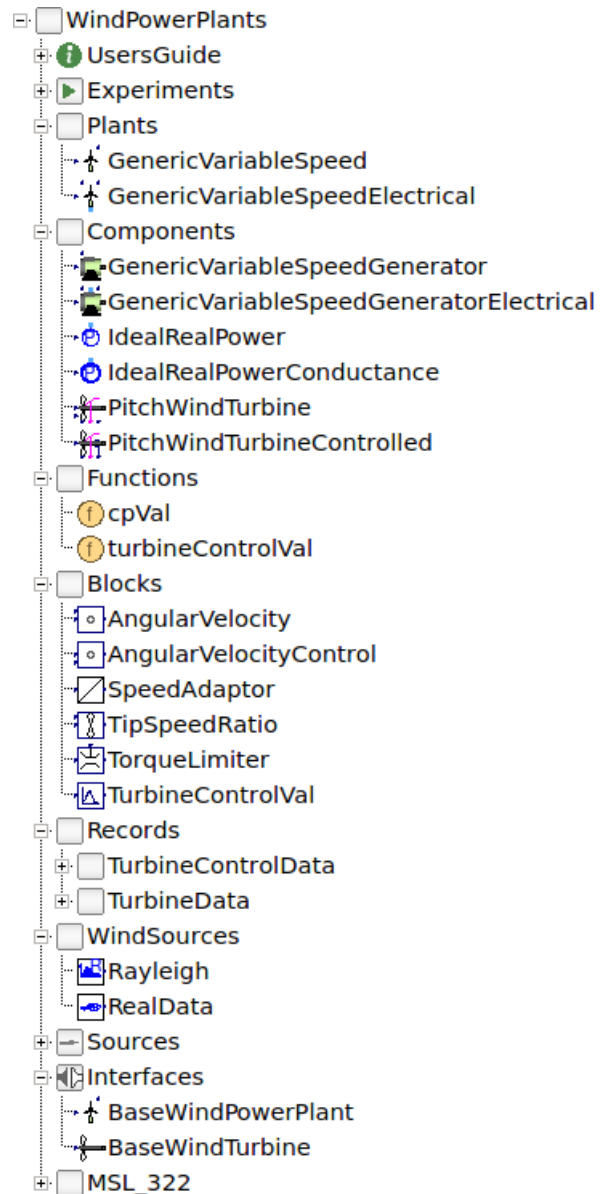


Figure 1. Library structure