

Design Evaluation Tool for Small Wind Turbine Systems Based on the Simple Load Model

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Abstract : The urgency to transition towards sustainable energy sources has revealed itself imperative. Today, in the 21st Century, the intellectual society have imposed technological advancements and improvements, and anticipates expeditious outcomes as an integral component of its relentless pursuit of an elevated standard of living. As a part of empowering human development, driving economic growth and meeting social needs, the access to energy services has become a necessity. As a part of these improvements, we are introducing the project "Mywindturbine" - an interactive web user interface for design and analysis in the field of wind energy, with a particular adherence to the IEC (International Electrotechnical Commission) standard 61400-2 "Wind turbines - Part 2: Design requirements for small wind turbines". Wind turbines play a pivotal role in Morocco's renewable energy strategy, leveraging the nation's abundant wind resources. The IEC 61400-2 standard ensures the safety and design integrity of small wind turbines deployed in Morocco, providing guidelines for performance and safety protocols. The conformity with this standard ensures turbine reliability, facilitates standards alignment, and accelerates the integration of wind energy into Morocco's energy landscape. The aim of the GUI (Graphical User Interface) for engineers and professionals from the field of wind energy systems who would like to design a small wind turbine system following the safety requirements of the international standards IEC 61400-2. The interface provides an easy way to analyze the structure of the turbine machine under normal and extreme load conditions based on the specific inputs provided by the user. The platform introduces an overview to sustainability and renewable energy, with a focus on wind turbines. It features a cross-examination of the input parameters provided from the user for the SLM (Simple Load Model) of small wind turbines, and results in an analysis according to the IEC 61400-2 standard. The analysis of the simple load model encompasses calculations for fatigue loads on blades and rotor shaft, yaw error load on blades, etc. for the small wind turbine performance. Through its structured framework and adherence to the IEC standard, "Mywindturbine" aims to empower professionals, engineers, and intellectuals with the knowledge and tools necessary to contribute towards a sustainable energy future.

Keywords : small wind turbine, IEC 61400-2 standard, user interface., simple load model

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