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Design of Grid-Connected Induction Generators for Variable Speed Wind Power Generation

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Abstract

Commonly standard induction machines are used for both constant speed (CS) and variable speed (VS) wind power generation. But the operational conditions of an induction machine for VS wind power generation are different from CS wind power generation and motor applications. This paper considers the operating condition of VS wind energy conversion system (WECS) in maximum power tracking mode for the exclusive design of squirrel-cage induction generator for VSWECS. In such a case, the induction machine always operate at a point close to the maximum torque and maximum efficiency. As a result, these maximums can be introduced to the sizing equations in place of conventionally defined rated efficiency, power factor and starting torque. This design strategy leads to downsizing of induction machine without sacrificing its capacity and performance. Evolutionary programming in MATLAB 6.5 platform was used as a design optimization tool.

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