Collaboration of Nonlinear Control Strategy and Pitch Angle Control of DFIG Equipped Wind Turbine during all Operating Regions

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Authors:
Moussa Reddak, Abdelmajid Berdai, Ayoub Nouaiti, Vladimir Vlasenko

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Abstract

Wind energy has marked in these last decades a great growth view its interest that present. But this energy is entirely dependent on the wind flow which is random and uncertain in the nature, and which can exceed the rated wind speed. So, the wind turbine must be protected against mechanical overload and possible risk of damages. In this paper, a control strategy of wind turbine equipped with the doubly fed induction generator DFIG is proposed for different wind regions. The interest of this control strategy is to extract the maximum power at wind speed below the rated value. Otherwise its objective is to protect the wind turbine and maintain the active power when the wind speed is above the rated value. To achieve a fast response of active and reactive powers that are controlled by the rotor currents, a nonlinear control based on the backstepping strategy is suggested. The simulation results reveal a better tracking of the references, and exploitation of the wind turbine in different wind regions.

References


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Index Terms

Computer Science  Applied Sciences

Keywords

Wind turbine, DFIG, control strategy, wind regions, backstepping strategy.