

Stability Analysis of DFIG Stator Powers Control Based on Sliding Mode Approach

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Abstract : The doubly fed induction generator (DFIG) received recently an important consideration in medium and high power wind energy conversion systems integration, due to its advantages compared to other generators types. The stator power sliding mode control (SPSMC) proves a great efficiency judge against other control laws and schemes. In the SPSMC laws elaborated by several authors, only the slide surface tracking conditions are elaborated using Lyapunov functions, and the boundedness of the DFIG states is never treated. Some works have validated their approaches by experiments results in the case of specified machines, but these verifications stay insufficient to generalize to other machines range. Adding to this argument, the DFIG states boundedness demonstration is widely suggested in goal to ensure that in the application of the SPSMC, the states evaluates within their tolerable bounds. Our objective in the present paper is to highlight the efficiency of the SPSMC by stability analysis. The boundedness of the DFIG states such as the stator current and rotor flux is discussed. Moreover, the states trajectories are finding using analytical proves taking into consideration the SPSMC gains.

Keywords : Doubly Fed Induction Generator (DFIG), Stator Powers Sliding Mode Control (SPSMC), lyapunov function, stability, states boundedness, trajectories mathematical proves

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