Abstract:

This paper presents a new synchronization algorithm for grid connection of a doubly fed induction generator (DFIG) in a variable speed wind generation system. Stator flux-oriented vector control for backto-back PWM converters in the DFIG rotor circuit is used for synchronization process. By controlling the rotor d-axis current, the magnitude of the stator EMF is adjusted to be equal to the grid voltage. PLL circuit is used to compensate for the phase shift between the stator EMF and the grid voltage. By controlling the turbine pitch angle, the generator speed is determined to adjust the stator frequency to be equal to the grid. The experimental results show a smooth synchronization and fast dynamic responses. Compared to the existing DFIG synchronization algorithms, the proposed method gives fast starting and can take only 2 cycles to be performed and has satisfactory performance and better robustness than existing methods.

Keywords:

DFIG; Synchronization; Stator flux-oriented vector control; Grid-utility

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