UTILIZATION OF STATE-SPACE BASED CONTROL TECHNIQUES FOR THE STABILITY ANALYSIS OF WIND TURBINE SYSTEMS

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A B S T R A C T

This work presents an approach to establish a mathematical model of Doubly Fed Induction Generator (DFIG) used in Wind Energy Conversion System (WECS) for power generation. Further, the small signal stability analysis of the developed model by using state-space based control techniques was perpetrated. In order to achieve the desired objectives, first state space model has been developed by using linearization methodology and then small signal stability has been probed with the help of eigenvalues and time response characteristics. The present work shows the effectiveness in terms of steady-state offset values. This study deals with the state space feedback control methodology for obtaining the desired specifications. The addition of controller enhances the system stability when subjected to small disturbances. For the verification of accuracy of the controllers, different simulations have been processed on the same plant and at same operating conditions. The results thus obtained are being compared with each other. All the works have been accomplished with the help of MATLAB software which are quite acceptable.

Keywords: doubly fed induction generator; eigenvalues; wind energy conversion system; pole placement; observer; small-signal stability; state space feedback