

Dynamic Performance Improvement of Wind Generation System Connected to a Multimachine Power System

M. Ahsanul Alam, A.H.M.A Rahim

Abstract

A multimachine power system model including both induction and synchronous generators has been developed. The induction generator dynamics have been embedded in the general formulation as an equivalent synchronous machine through the slip dynamics term. The impact of connection of the induction generator through a weak as well as strong network connection is studied. For the induction generator, post-fault voltage recovery pattern in relation to received reactive power support from the grid is examined in the framework of multimachine power system. It is observed that a fast and adequate reactive power support is very important for the smooth recovery of induction generator terminal voltage. Improvement of dynamic performance of system through the introduction of a variable susceptance control circuit located at the induction generator terminal is investigated. Further enhancement of the dynamic performance with the introduction of additional PI control in the susceptance control circuit has been examined. The variable susceptance excitation scheme with auxiliary PI control is observed to provide very good transient performance. The proposed controller structure is very simple and employs signal local to each machine. It also performs in a robust manner.

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