Modal-Based Analysis of Induction Generator-Infinite Bus System

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Abstract

Induction machines continue to be one of the most important inventions for mechanical power production when operated as motors and for electric power production when operated as generators. This paper presents a linearized model for a simple system consisting of an induction generator (IG) connected to an infinite bus through a linear passive transmission network. This model is used for studying small signal stability and for modal analysis of the system as affected by the network parameters and initial operating conditions. The considered network parameters are the series impedance of the interconnecting network and the shunt capacitive susceptance at the generator terminals. Moreover, a general algorithm is given for selecting the external network parameters that secure system stability and generator terminal voltage level. The work in this paper is valuable in both the design stage and analysis of induction generator based systems.

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