# Dynamical and Transient Analysis of a Stand-Alone Self-Excited Induction Generator Application in Wind Turbine

Changiz Salimikordkandi and Hossein Hafezi
Electric Electronic Engineering Department of Doku z Eylul University, Izmir, Turkey,
changiz.salimi@gmail.com
Electric Electronic Engineering Department of Dokuz Eylul University, Izmir, Turkey,
hafezi.hossein@gmail.com

*Abstract*— Against to synchronous generators, self –excited induction generators (SEIGs) are found to be suitable machines for wind energy conversion in remote and windy areas. However, SEIG has poor voltage and frequency regulation that restricts its wide applicability. In order to regulate the generated voltage and frequency, the machine is analyzed in both steady-state and dynamic manner. The steady-state analysis has been investigated in last few years by many papers. The dynamic analysis is the main issue in isolated application of induction generator and it plays a fundamental role in better understanding of the machine's characteristics. This paper presents a dynamic model of SEIG analysis in qd0 stationary reference frame with balanced capacitors and supplying balanced load. Both dynamic simulation results and steady-state analysis, based on computer simulation, are coincided by experimental results, based on laboratory setup on a 1.1 kW induction machine. SEIG behavior has been investigated considering the effect of the main and cross flux saturation for various transient conditions. In order to drive the SEIG in constant speed, a DC machine is used on the setup. The simulation has been performed by MATLAB software. Three parameters have been selected as comparison criteria; i.e. voltage, current and frequency stator.