CHAPTER 48

TECHNOLOGY
ELECTRICAL ENGINEERING

Doctoral Thesis

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Investigations on Solid State Controllers for Self-Excited Induction Generators.
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Abstract

In the present works graphic user interface (GUI) tools in MATLAB software have been developed for steady-sate analysis and computation of excitation requirement under different configuration of SEIG. The developed tools provide an easy and user friendly way of evaluating the performance of SEIG system. Analysis of SEIG with a static compensator (STATCOM) connected in parallel with the load has been carried out to study the improvement in its voltage regulation, while SEIG is driven through a constant speed prime-mover such as gasoline engine. A complete mathematical model of SEIG-STATCOM system is derived and a MATLAB/Simulink model of the scheme is developed for analysis of system response under different load conditions. Analysis of series compensator based voltage regulating scheme has also been carried out. A static series compensator also known as static synchronous series compensator (SSSC) provides variable series compensation. It emulates either a series inductive reactance shunt or capacitive reactance by injecting a compensating voltage in quadrature with SEIG line currents. Therefore, it provides a variable VAR with increasing loads on the SEIG and hence an effective means to regulate SEIG voltage even in distorted and unbalance terminal voltage conditions. A MATLAB/Simulink model of SEIG-SSSC system is developed for the study of series compensator based voltage regulating scheme for SEIG.

Contents

three-phase self-excited induction generator using MATLAB/ Simulink. 5. Matlab based modeling of electronic load controller for seig. 6. Matlab based modeling of seig-statcom system. 7. Decoupled solid-state load controller for seig. 8. Matlab based modeling of series capacitor compensated seig-statcom system. 9. Analysis of static synchronous series compensator (SSSC) based voltage regulating scheme for the seig. 10. Main conclusions and suggestions for further work. Apendices.