

Abstract

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Comparison Analysis of AC Voltage Controllers Based on Experimental and Simulated Application Studies

This paper introduces a detailed comparison between possible connections of AC voltage controllers. For each configuration, the experimental setup is implemented and the corresponding simulation program is presented using Simulink under Matlab. The simulated and experimental instantaneous voltage and current waveforms in case of resistive and inductive loads are matched well, validating the simulation comparison for analysis. The comparison analysis includes the required number of devices and isolated gate signals, which determines the complexity and the size, hence the overall cost. Also harmonic spectrum, total harmonic distortion, effective rms value, dc offset and the control range are compared to specify the performance. The implementation of a fixed-capacitor thyristor controlled reactor (FC-TCR) and three phase induction motor starters (SOFT STARTER) as two application case studies of AC voltage regulators has been discussed. Experimental and simulation results have been obtained and well correlated, showing the effectiveness of such configurations in the fields of control of reactive power flow and in the field of controlling the starting performance of three phase induction motor