

Investigation of Grid Supply Harmonic Effects in Wound Rotor Induction Machines

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Abstract : This paper presents an in-depth investigation of the effects of several grid supply harmonic voltages on the stator currents of an example wound rotor induction machine. The observed effects of higher order grid supply harmonics are identified using a finite element time stepping transient model, as well as a time-stepping electromagnetic model. In addition, a number of analytical equations to calculate the spectral content of the stator currents are presented in the paper. The presented equations are validated through comparison with the obtained spectra predicted using the finite element and electromagnetic models. The presented study provides a better understanding of the origin of supply harmonic effects identified in the stator currents of the example wound rotor induction machine. Furthermore, the study helps to understand the effects of higher order supply harmonics on the harmonic emissions of the wound rotor induction machine.

Keywords : wound rotor induction machine, supply harmonics, current spectrum, power spectrum, power quality, harmonic emissions, finite element analysis

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