

Control Methods Used to Minimize Losses in High-Speed Electrical Machines

Authors : Mohammad Hedar

Abstract : This paper presents selected topics from the area of high-speed electrical machine control with a focus on loss minimization. It focuses on pulse amplitude modulation (PAM) set-up in order to minimize the inrush current peak. An overview of these machines and the control topologies that have been used with these machines are reported. The critical problem that happens when controlling a high-speed electrical motor is the high current peak in the start-up process, which will cause high power-losses. The main goal of this paper is to clarify how the inrush current peak can be minimized in the start-up process. PAM control method is proposed to use in the frequency inverter, simulation results for PAM & PWM control method, and steps to improve the PAM control are reported. The simulations were performed with data for PMSM (nominal speed: 25 000 min⁻¹, power: 3.1 kW, load: 1.2 Nm).

Keywords : control topology, frequency inverter, high-speed electrical machines, PAM, power losses, PWM

Conference Title : ICPEDIA 2021 : International Conference on Power Electronic Devices and Industrial Applications

Conference Location : Prague, Czechia

Conference Dates : March 22-23, 2021