Implementation of an Excitation Controller for an Impulse Motor-Generator

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An energy-stored impulse motor-generator (MG) is used in power supply system of HL-2A tokamak to produce short high-voltage or high-current surges of desired parameters that are usually used for magnetic field coils and auxiliary heating equipment loads. The operation changing of these loads will cause disturbances in generator's terminal voltage and the remark drop in MG's rotating speed. This paper describes the implementation of an excitation controller using LabVIEW and CompactRIO for the 125MVA impulse MG in power supply system of HL-2A/2M. Both a staged control strategy and digital PID algorithm built in LabVIEW are applied to the excitation controller that runs preciously in a one millisecond cycle to achieve voltage feedback control. The proposed excitation controller, composed mainly of host computer and CompactRIO embedded reconfigurable system, is available to restore and stabilize terminal voltage in accordance with the desired voltage waveform set by operators when pulsed loads and motor speed change quickly, also implements real-time monitoring of the working condition and some electrical parameters of excitation system and communicates with central control system via Ethernet to either download discharge control files at time interval between two impulse discharges or upload waveform data generated in control process after a pulsed discharge. Engineering experiment results show that the use of excitation controller improves the voltage stiffness of the power supply system and provides effective control of generator's terminal voltage under the management of central control system.

Eligible for student paper award?

Yes

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