Design of Direct Power Controller for a High Power Neutral Point Clamped Converter Using Real-Time Simulator

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Abstract : In this paper, a direct power control (DPC) strategies have been investigated in order to control a high power AC/DC converter with time variable load. This converter is composed of a three level three phase neutral point clamped (NPC) converter as rectifier and an H-bridge four quadrant current control converter. In the high power application, controller not only must adjust the desired outputs but also decrease the level of distortions which are injected to the network from the converter. Regarding this reason and nonlinearity of the power electronic converter, the conventional controllers cannot achieve appropriate responses. In this research, the precise mathematical analysis has been employed to design the appropriate controller in order to control the time variable load. A DPC controller has been proposed and simulated using Matlab/Simulink. In order to verify the simulation result, a real-time simulator- OPAL-RT- has been employed. In this paper, the dynamic response and stability of the high power NPC with variable load has been investigated and compared with conventional types using a real-time simulator. The results proved that the DPC controller is more stable and has more precise outputs in comparison with the conventional controller.

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Keywords : direct power control, three level rectifier, real time simulator, high power application

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