Interactions Between Indirect DC-Voltage Estimation and Circulating Current Controllers of MMC-Based HVDC Transmission Systems

Estimation-based indirect dc-voltage control in MMCs interacts with circulating current control methods. This paper proposes an estimation-based indirect dc-voltage control method for MMC-HVDC systems and analyzes its performance compared to alternative estimations. The interactions between estimation-based indirect dc-voltage control and circulating current control methods, active/reactive power regulation are also investigated. The proposed method delivers similar performance to measurement-based direct dc-voltage control, regardless of the circulating current control method. Steady-state and transient performance is demonstrated using a benchmark MMC-HVDC transmission system, implemented in a real-time digital simulator. The results verify the theoretical evaluations and illustrate the operation and performance of the proposed indirect dc-voltage control method.

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