Title: HVDC transmission systems: Bipolar back-to-back diode clamped multilevel converter with fastoptimum-predictive control and capacitor balancing strategy

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Abstract: Voltage source multilevel power converter structures are being considered for high power high voltage applications where they have well known advantages. Recently, full back-to-back connected multilevel neutral diode clamped converters (NPC) have been used in high voltage direct current (HVDC) transmission systems. Bipolar back-to-back connection of NPCs have advantages in long distance HVDC transmission systems, but highly increased difficulties to balance the dc capacitor voltage dividers on both sending and receiving end NPCs.
This paper proposes a fast optimum-predictive controller to balance the dc capacitor voltages and to control the power flow in a long distance HVDCsystem using bipolar back-to-back connected NPCs. For both converter sides, the control strategy considers active and reactive power to establish ac grid currents on sending and receiving ends, while guaranteeing the balancing of both NPC dc bus capacitor voltages. Furthermore, the fast predictivecontroller minimizes the semiconductor switching frequency to reduce global switching losses.
The performance and robustness of the new fast predictive control strategy and the associated dc capacitors voltage balancing are evaluated. (C) 2011 Elsevier B.V. All rights reserved.

Author Keywords: HVDC Multilevel Converters; Bipolar HVDC VSC; dc Bus Voltages Balancing; Predictive Control Strategy

KeyWords Plus: Inverter; Voltages; Limits

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