

Impact of current limiters and fast voltage boosters in grid-forming VSC-based generators on transient stability

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Abstract-

Transient stability is a complex phenomenon presented in multi-machine and multi-converter systems, and it is still considered a key limiting factor for stressed power systems. The increasing integration of non-synchronous generation further emphasises the need to address the challenges of improving the transient stability faced by these power systems. Several studies have focused on developing control strategies for Grid-forming voltage source converter (GFM-VSC) to improve transient stability. These strategies include the use of current limiting algorithms and/or control of active/reactive power injections. This paper investigates the impact of fast voltage boosters (FVBs) and hybrid current limiters (HCLs) on transient stability of power systems with 100% grid-forming VSC-based generators. Short-circuit simulations and critical clearing time analysis are performed to evaluate the effectiveness of HCLs and FVBs in improving transient stability. The simulation results demonstrate the effectiveness of these approaches in avoiding the loss of synchronism. This research contributes to the current studies on transient stability in power systems and provides valuable insights into the potential of HCLs and FVBs as effective approaches to improve system stability.

Index Terms- Voltage source converter; VSC; Grid forming; Transient stability

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