

A Review of HVDC Modular Multilevel Converters Subjected to DC and AC Faults

Authors : Jude Inwumoh, Adam P. R. Taylor, Kosala Gunawardane

Abstract : Modular multilevel converters (MMC) exhibit a highly scalable and modular characteristic with good voltage/power expansion, fault tolerance capability, low output harmonic content, good redundancy, and a flexible front-end configuration. Fault detection, location, and isolation, as well as maintaining fault ride-through (FRT), are major challenges to MMC reliability and power supply sustainability. Different papers have been reviewed to seek the best MMC configuration with fault capability. DC faults are the most common fault, while the probability that AC fault occurs in a modular multilevel converter (MCC) is low; though, AC faults consequence are severe. This paper reviews several MMC topologies and modulation techniques in tackling faults. These fault control strategies are compared based on cost, complexity, controllability, and power loss. A meshed network of half-bridge (HB) MMC topology was optimal in rendering fault ride through than any other MMC topologies but only when combined with DC circuit breakers (CBS), AC CBS, and fault current limiters (FCL).

Keywords : MMC-HVDC, DC faults, fault current limiters, control scheme

Conference Title : ICEEE 2019 : International Conference on Electrical Engineering and Electronics

Conference Location : Sydney, Australia

Conference Dates : December 02-03, 2019