

Abstract

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Current source back-to-back converter for wind energy conversion systems

This study proposes a new back-to-back current source converter (BTB-CSC) suitable for medium-voltage high power wind energy conversion systems (WECSs). It employs a dual three-phase permanent magnet synchronous generator and two current source inverters with a phase-shift transformer at the grid side. The proposed BTB-CSC has the following advantages: reduced power circuit and control complexity, low switching losses (zero switching losses at the inverter side) and independent control of active and reactive powers. Power system computer aided design (PSCAD)/electromagnetic transients including DC (EMTDC) simulations are used to assess the steady state and dynamic behaviour of the proposed system under different operating conditions. It is shown that the proposed WECS can ride-through ac faults. Experimental results from scaled prototype of the proposed WECS are used to validate the simulations.