

Security analysis of interconnected AC/DC systems - DTU Orbit (08/11/2017)

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This paper analyses N-1 security in an interconnected ac/dc transmission system using power transfer distribution factors (PTDFs). In the case of a dc converter outage the power needs to be redistributed among the remaining converter to maintain power balance and operation of the dc grid. The redistribution of power has a sudden effect on the power-flow in the interconnected ac system. This may cause overloading of lines and transformers resulting in disconnection of equipment, and as a consequence cascading failure. The PTDF is used as a method to analyze and avoid violating limits by in the dc voltage control design consider the power distribution for a converter outage. By proper design and utilizing the proposed method increases the N-1 security and the secure transfer limits. This article proposes a method which minimizes the 2-norm of the sum of the PTDFs with constraints of not violating any line or transformer limits. Simulations were performed in a model of the Nordic power system where a dc grid is placed on top. The simulation supports the method as a tool to consider transfer limits in the grid to avoid violate the same and increase the security after a converter outage.

General information

State: Published

Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Electric power systems

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Number of pages: 6

Pages: 1-6

Publication date: 2015

Host publication information

Title of host publication: Proceedings of 2015 Australasian Universities Power Engineering Conference (AUPEC)

Publisher: IEEE

ISBN (Print): 9781479987252

Main Research Area: Technical/natural sciences

Conference: 2015 Australasian Universities Power Engineering Conference, Wollongong, Australia, 27/09/2015 - 27/09/2015

load flow, power convertors, power system control, power system interconnection, power system reliability, power system security, power system simulation, voltage control, Components, Circuits, Devices and Systems, Engineering Profession, Power, Energy and Industry Applications, Robotics and Control Systems, Signal Processing and Analysis, DC voltage control, HVDC transmission, interconnected AC-DC systems security analysis, Jacobian matrices, Linear programming, Load flow control, N-1 security, Nordic power system, Power distribution, power distribution converter outage, Power system faults, Power system stability, power transfer distribution factors, PTDF, Security, Voltage control

DOIs:

10.1109/AUPEC.2015.7324794

Source: FindIt

Source-ID: 276552314

Publication: Research - peer-review › Article in proceedings – Annual report year: 2015