On the convergence of the sequential power flow for multiterminal VSC AC/DC systems

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Abstract— Following the vision of future Supergrids, the existing power systems are expected to evolve into AC/DC systems containing Voltage Source Converters with multiterminal configurations.

This paper presents a new sequential power flow algorithm for such power systems. The algorithm can be applied to systems with multiple AC and DC grids of any grid topology. Because of its pure AC/DC network decomposition, the simplification of elements within the converter stations is not required, as is the case with other proposals in the literature. The paper also addresses the convergence properties of the proposed algorithm. A convergence factor has been designed that allows controlling the exit criterion within each inner loop of the sequential AC/DC load flow problem. It is shown that by modulating the convergence factor the number of inner loop iterations needed to achieve a solution can be diminished.

Index Terms— AC/DC, HVDC transmission, multiterminal, MTDC, power flow analysis, Voltage Source Converter (VSC)

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