Offshore windfarm connection with low frequency AC transmission technology

This paper investigates the feasibility of using the low frequency AC transmission (LFAC) system, e.g. fraction of 50 Hz or 60 Hz, for connecting the large offshore wind farm to the grid by modelling and simulation. The LFAC system improves the transmission capacity and distance compared to the conventional AC solution at the nominal frequency, e.g. 50 Hz or 60 Hz. and reduces the investment cost compared to the HVDC solution. It is estimated that the LFAC system is competitive in the transmission distance of about 30-150 km. The simulation model of the wind integration using the LFAC system has been developed, which consists of three parts, the fixed-speed wind turbine representing a wind farm, the transmission line and the frequency converter. Although the transmission capability is greatly improved by the LFAC system, simulation shows it gives negative influences on the wind turbine operation due to the reduced inductive reactance of the grid. Moreover, the harmonics introduced by the frequency converter may require extra filters to be installed in such system.

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