Coordinated frequency control from offshore wind power plants connected to multi terminal DC system considering wind speed variation - DTU Orbit (23/04/2019)

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A coordinated fast primary frequency control scheme from offshore wind power plants (OWPPs) integrated to a three terminal high voltage DC (HVDC) system is proposed in this study. The impact of wind speed variation on the OWPP active power output and thus on the AC grid frequency and DC grid voltage is analysed. The removal of active power support from OWPP after the frequency control action may result in second frequency (and DC voltage) dips. Three different methods to mitigate these secondary effects are proposed, such as, (i) Varying the droop gains of the HVDC converter (ii) Releasing the active power support from OWPP with a ramp rate limiter and (iii) An alternative method for the wind turbine overloading considering rotor speed. The effectiveness of the proposed control scheme is demonstrated on a wind power plant integrated into a three terminal HVDC system developed in DlgSILENT PowerFactory. The results show that the proposed coordinated frequency control method performs effectively at different wind speeds and minimises the secondary effects on frequency and DC voltage.

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