

新能源与分布式发电

多端VSC-HVDC用于风电场联网时的控制策略

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摘要:

基于双馈感应电机(double fed induction generator, DFIG)控制策略, 提出了多端电压源换流器高压直流输电(multi-terminal VSC-HVDC, MVSC-HVDC)用于风电场并网的联网方式, 设计了相关的控制策略, 通过与交流联网方式相比, 指出了MVSC-HVDC的可行性和合理性。在PSCAD/EMTDC的仿真环境下, 建立了相关的数学模型, 研究了风电场之间及其内部机组在系统稳态和故障情形下的运行情况。仿真结果表明: DFIG的等效模型能够正常稳定的工作, 所提出的并网方式和控制策略是正确和有效的; 风电场之间以及风电场内部各机组之间都独立运行, 互不影响; 当逆变侧交流系统发生故障时, 该控制策略有较快的恢复特性, 可有效抑制风机投切带来的冲击。

关键词: 双馈感应电机(DFIG) 多端电压源换流器高压直流输电(MVSC-HVDC) 风电场联网 控制策略

Control Strategy for Interconnection of Wind Farms by Multi-Terminal VSC-HVDC

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Abstract:

Based on the control strategy for doubly fed induction generator (DFIG), an interconnecting mode for wind farms with power grid is proposed by use of multi-terminal voltage source converter high voltage direct current (MVSC-HVDC) power transmission, and a control strategy related to the proposed interconnection mode is developed. Comparing with traditional interconnection ways, the feasibility and reasonableness of the proposed interconnection mode are pointed out. Taking PSCAD/EMTDC as simulation environment, corresponding mathematical model is built to research the operation conditions among wind farms and their internal generation units under steady and transient states of power grid. Simulation results show that the equivalent models of DFIG can run normally and steadily, so the proposed interconnection mode and control strategy are correct and effective; wind farms as well as the units inside them can independently operate without interaction; when faults occur in AC power system at inversion side, the proposed control strategy possesses fast recovery characteristic that can effectively suppress the impacts caused by switching in/off of wind turbine generators.

Keywords: doubly fed induction generator (DFIG) multi-terminal voltage source converter high voltage direct current (MVSC-HVDC) wind farm interconnection control strategy

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