电力系统

基于2阶轨迹灵敏度的暂态稳定约束最优潮流计算

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摘要：

针对现有基于轨迹灵敏度技术的暂态稳定约束潮流计算中存在的问题，计算出发电机转角对控制变量的2阶轨迹灵敏度，并利用1阶和2阶轨迹灵敏度更精确地描述发电机转角与所有发电机有功和无功出力之间的2阶泰勒展开表达式。此外，根据时域仿真，将多机系统等值为单机无穷大母线系统，并根据等值系统的临界功角轨迹建立严格的暂态稳定判据。据此可建立更为合理的暂态稳定约束最优潮流模型。新英格兰10机39节点和UK 20机100节点系统的仿真结果验证了该方法的准确性和有效性。

关键词： 最优潮流 暂态稳定 2阶轨迹灵敏度 单机无穷大母线等值 临界功角轨迹

Transient Stability Constrained Optimal Power Flow Calculation Based on Second-Order Trajectory Sensitivity

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Abstract:

In allusion to the problems in transient stability constrained power flow calculation based on existing trajectory sensitivity, the second-order trajectory sensitivity of generator rotor angle to control variables is calculated and by use of first- and second-order trajectory sensitivity the second-order Taylor expansion expression between the rotor angle of a certain generator and active and reactive power output of all generators is described more precisely. Besides, according the time-domain simulation, a multi-machine system is equivalently changed to a single-machine infinitive-bus system, and based on the critical angle trajectory of the equivalent system a rigorous transient stability criterion is built, by which a more reasonable transient stability constrained optimal power flow model can be built. The accuracy and effectiveness of the proposed method are verified by simulation results of New England 10-machine 39-bus system and UK 20-machine 100-bus system.

Keywords: optimal power flow   transient stability   second-order trajectory sensitivity   one-machine infinite bus equivalence   critical rotor angle trajectory

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