

电力系统运行与规划

电网状态检修概念与理论基础研究

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摘要:

状态检修背景下, 为解决电网运行整体与输变电设备个体之间的矛盾和冲突, 在已有研究成果基础上, 提出电网状态检修的概念, 在输变电设备状态检修决策过程中, 给出电网故障风险和电网检修风险的定义以及相应的量化表达式。依据设备状态预测, 以电网故障风险和电网检修风险的和最小为目标, 将设备检修、运行以及电网整体性能在概率引导下相互牵制, 形成电网状态检修的数学模型, 并给出相应的解决方法。最后, 为验证该理论研究的可行性, 分别以可靠性测试系统RBTS-BUS6和IEEE-RTS79系统为例, 对各种情况进行分析, 体现了预期的效果, 并期望为电网检修与运行协调决策理论的深入研究提供必要的理论基础。

关键词: 输变电设备 状态检修 故障风险 检修风险 协调决策

Basic Concept and Theoretical Study of Condition-based Maintenance for Power Transmission System

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Abstract:

With the development of condition-based maintenance, contradictions have been found between the transmission equipment and the power transmission system. To cope with this problem, the concept of condition-based maintenance for power transmission systems was put forward based on the existing research results. During the decision-making process, the definition and quantitative expression of the failure risk and maintenance risk were provided. On the basis of the condition trend prediction for the transmission equipment, the mathematics model and corresponding solutions were presented to minimize the sum of failure risks and maintenance risks, and get a balance between the equipment maintenance, operation and the efficiency of power transmission systems. The analysis of the RBTS-BUS6 and IEEE-RTS79 system demonstrates the validity and practicability of the proposed concept, which provides a necessary foundation for the further research on the cooperation decision-making between maintenance and operation of power systems.

Keywords: power transmission equipment condition-based maintenance failure risk maintenance risk coordinated decision-making

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