

电力系统运行与规划

发电系统运行风险的评估算法

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摘要:

为了更加准确地衡量发电系统的运行风险,在简要介绍发电系统运行风险评估的内涵及其与传统可靠性评估关系的基础上,提出一种考虑发电机实时运行状态的发电系统运行风险评估算法。该方法将发电机分为时变与非时变2种类型,应用马尔可夫理论推导出2种类型发电机的时间相关停运概率模型。采用一种计及发电机实时运行状态的停运率模型来计算各发电机的实时停运率,并根据风险理论建立发电机非计划停运给发电系统造成的经济损失后果模型。最后给出发电系统所处各种有功输出状态的概率、期望有功输出和期望经济损失3个指标,用以衡量其实时运行风险的大小。通过对算例IEEE RTS-79的计算分析验证所提算法的有效性。

关键词: 发电系统 风险 实时运行条件 马尔可夫理论 停运率模型

Method of Operational Risk Assessment for Generating System

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Abstract:

In order for evaluating the risk of generating system more accurately, this paper introduced the generating system operational risk assessment concept and the relationship between it and traditional reliability evaluation. In this paper, the author put forward an operational risk assessment algorithm for generating system, in which the operating conditions of generator was considered. In this algorithm the generators were divided into two types: time-varying and non-time-varying generator, the time-dependent outage probability of each type was deduced based on Markov theory. The outage rate of generator was calculated by a method in which the operating conditions of generator had been considered. The economic loss model which was caused by unplanned shutdown of generator was also established. At last, the algorithm developed three indices, including the probability of all kinds of active power output states, active power output expectation and economic loss expectation, which can measure the real time operational risk of power plant. The calculation and analysis of IEEE-RTS 79 reliability test systems show that the proposed algorithm is effective.

Keywords: generating system risk real time operating condition Markov theory outage rate model

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