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反应堆工程

基于相关故障的核动力装置可靠性分析

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摘要 核动力装置固有的复杂性导致了系统的相关性，而相关故障使系统的故障率增加。传统的基于独立故障的可靠性分析方法对系统可靠性的估计偏高。本文基于核动力装置相关故障的诱发机理分析与模型建立，以典型的冗余泵单元为例，分别采用β因子模型与马尔可夫模型对密封故障与切换失效两类相关故障进行了分析，为相关故障条件下复杂系统的可靠性分析提供了一种新的技术方法。通过与传统可靠性分析方法结果的比较，验证了该方法的正确性。

关键词 相关故障 可靠性分析 核动力装置 β因子模型 马尔可夫模型

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Reliability Analysis of Nuclear Power Plant Based on Dependent Failure

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Abstract Dependent failures existing in nuclear power plant make the failure probability increase. The reliability got by traditional methods with only independent failure is greater than actual value. The arousing factors of dependent failures in nuclear power plant were analyzed firstly. Taking the typical unit with redundant pumps as example, the seal damage failure and shift failure were analyzed with β factor and Markov model. The new method is very practical to analyze the dependency of complex systems with dependent failure.

Key words dependent failures reliability analysis nuclear power plant β factor model Markov model

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