

反应堆工程

反应堆冗余系统共因失效参数的映射及不确定性分析

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摘要 根据两种主要的共因失效机理, 对缺乏数据的目标系统进行了共因失效率和 α 因子的映射分析, 推导出了其上下映射的公式, 并引入映射比率 θ , 对共因失效率和 α 因子的映射表达式进一步修正。采用概率发生函数, 根据权值得到系统共因失效率的均值和方差, 并结合映射得出各阶共因失效参数的均值和方差之间的关系表达式。结果表明, 应用映射法和概率发生函数对共因失效参数进行不确定性分析, 是依据源系统的经验数据来估计共因失效参数的一种有效方法。

关键词 [共因失效](#) [\$\alpha\$ 因子](#) [映射](#) [不确定性分析](#) [冗余系统](#) [反应堆](#)

分类号

Mapping and Uncertainty Analysis of Common Cause Failure Parameters of Redundancy System in Nuclear Reactor

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Abstract On the basis of two main common cause failure mechanisms, common cause failure rates and α factor of target system with lacking data were analyzed, expressions of their mapping up and down were deduced, and then mapping ratio θ was introduced to revise their expressions. Moments of common cause failure rates were obtained in the terms of the weights by using probability generating functions, and expressions of the moments of each order common cause failure rate were obtained by combining mapping method. The results show that using mapping method and probability generating function to analyze uncertainty of common cause failure parameters is an effective method to combine experience data of source systems to estimate common cause failure parameters.

Key words [common](#) [cause](#) [failure](#) [\$\alpha\$ factor](#) [mapping](#) [uncertainty](#) [analysis](#) [redundancy](#) [system](#) [nuclear](#) [reactor](#)

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