

# 基于 TOPSIS 的故障树综合分析方法研究

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**摘要:** 针对传统故障树分析得到的诊断序列存在局部最优的问题, 研究提出基于 TOPSIS 的综合分析方法, 以概率重要度、结构重要度、关键重要度为分析指标, 构建集定量与定性为一体的综合分析方法. 同时, 针对 TOPSIS 参数权重主观确定而导致的结果合理性弱的问题, 引入熵权系数定量确定参数权重. 另外, 针对可能出现多个底事件分析结果相同的问题, 提出检测优先级的概念, 对分析结果相同的底事件进行二次排序, 得到准确的诊断序列. 通过实例验证发现, 本方法所生成的诊断序列较传统方法在准确性和科学性方面具有一定的改进效果.

**关键词:** 故障树分析; TOPSIS; 熵权系数; 检测优先级; 综合分析

## Research on Fault Tree Comprehensive Analysis

### Method Based on TOPSIS

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**Abstract:** In this paper, a new method based on TOPSIS is proposed, which is based on the comprehensive analysis method of TOPSIS. The importance degree, the importance degree of the structure and the key importance degree are used as the analysis index to construct the integrated and quantitative Analytical method. At the same time, according to the problem that the result of TOPSIS parameter is subjective and the result is weak, the entropy weight coefficient is used to quantitatively determine the parameter weight. In addition, the concept of detection priority is proposed to solve the problem of the same result, and the bottom events with the same analysis result are sorted and the exact diagnosis sequence is obtained. It is found that the diagnostic sequence generated by this method has some improvement effect compared with the traditional method in terms of accuracy and scientificity.

**Key words:** fault tree analysis; TOPSIS; entropy weight coefficient; detection priority; comprehensive analysis

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