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基于FTA仿真的三高气田事故风险概率

许金华[1,2], 孙德强[2], 范英[2], 任庆娟[1]

1. 中国科学技术大学 管理学院, 合肥 230026;
2. 中国科学院科技政策与管理科学研究所 能源与环境政策研究中心, 北京 100190

Accident risk probability for"Three Highs"gas fields based on fault tree analysis

XU Jin-hua[1,2], SUN De-qiang[2], FAN Ying[2], REN Qing-juan[1]

1. School of Management, University of Science and Technology of China, Hefei 230026, China;
2. Center for Energy and Environmental Policy Research, Institute of Policy and Management, Chinese Academy of Sciences, Beijing 100190, China

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全文: PDF（KB) HTML（KB) 输出: BibTeX | EndNote (RIS)　　背景资料

摘要 高含硫、高压、高产的"三高"气田的钻完井事故概率计算是国内外钻完井事故风险评价中的重点和难点,为全面刻画事故发生机理,合理计算事故风险概率,针对三高气田钻完井阶段事故风险建立了事故树,结合事故树仿真方法和贝叶斯修正方法提出了三高气田钻完井事故风险概率评估方法,将现有现场统计资料和专家判断相结合,对基本事件失效率及失效概率进行统计推断,并利用Monte Carlo仿真得到井喷事故及相关事故的失效概率分布. 实证结果表明,该研究方法有效弥补了因样本数据有限和经验判断差异带来的不确定性,可以为三高气田事故风险定量评价提供依据.

关键词: 事故树分析法(FTA)　 事故概率　 Monte Carlo仿真　 定量风险评价　 井喷

Abstract: The accident probability calculation of the gas fields with high sulfur content, high pressure, and high yield (3-highs) has been the focal and difficult point in risk assessment for gas well drilling accidents in China and abroad. In order to calculate the accident rate reasonably, the paper used the fault tree method and Bayesian updating to research the accident probability of the gas well drilling with 3-highs. Firstly, the paper described the mechanism of the accidents using fault tree analysis (FTA), then made use of Bayesian method to update existing statistic data for reducing uncertainty, and got the probability distributions of the top event and related incidents with Monte Carlo simulation finally. Empirical results show that the method could effectively reduce the uncertainty arisen from limited sample data and judge difference from experts, and could provide reference for quantitative risk assessment of the gas well drilling with 3-highs.

Key words: fault tree analysis (FTA)　 accident probability　 Monte Carlo simulation　 quantitative risk assessment　 blowout

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