

反应堆工程

AP1000自动降压系统误开启事故仿真分析

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摘要 针对AP1000的具体结构和运行特点, 采用FORTRAN程序设计语言, 开发了AP1000瞬态热工水力计算程序RETAC。利用RETAC对AP1000自动降压系统(ADS)误开启事故进行仿真分析, 得到稳压器压力、堆芯归一化热功率、堆芯归一化流量、堆芯平均温度、燃料中心最高温度和最小偏离核态沸腾比(MDNBR)等主要系统参数的响应特性。分析结果表明, 在稳压器低压停堆保护的作用下, 燃料中心最高温度和MDNBR未超出规定限值, 满足安全准则要求。并将计算结果与美国西屋公司AP1000分析软件LOFTRAN的计算结果进行对比, 对比趋势符合良好, 证明了RETAC建模和自动降压系统临界流模型计算的合理性。

关键词 [AP1000](#) [自动降压系统](#) [误开启](#) [仿真分析](#)

分类号

Simulation Analysis of Inadvertent Opening of Automatic Depressurization System for AP1000

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Abstract Based on the structural and operational characteristics of AP1000, a thermal-hydraulic computer code RETAC was developed using FORTRAN language. The code was adopted to analyze the inadvertent opening of automatic depressurization system (ADS) and transient characteristics of some main system parameters were obtained, including pressurizer pressure, normalized core thermal power, normalized core flow rate, core average temperature, the maximum fuel temperature and MDNBR. The results show that the maximum fuel temperature and MDNBR do not exceed specified limits and meet the safety criteria under the protection of pressurizer low-pressure shut-down signal. The computed results were compared with the results of thermal-hydraulic analysis code LOFTRAN for AP1000 developed by Westinghouse Electric Corporation. The trend shows a good agreement and thus proves the applicability and accuracy of the modeling of RETAC and the calculation of ADS critical flow rate.

Key words [AP1000](#) [automatic depressurization system](#) [inadvertent opening simulation analysis](#)

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