

反应堆工程

# 核电厂管线中的温度振荡现象研究

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**摘要** 在核电厂中, 如何更好地了解 and 预防由于温度振荡而导致的管线热疲劳, 对于确保核电厂的安全和可靠运行具有重要意义。本文以核电厂安注系统某支管为研究对象, 运用计算流体力学软件, 结合二次开发, 采用修正的 $k-\varepsilon$ 模型, 模拟了阀门渗漏冷水进入含有高温水的支管后所发生的温度振荡现象, 并与实验测量进行了对比。数值模拟的结果和实验基本吻合, 并全面地反映了整个管线中的温度振荡现象, 为更好地监控管线热疲劳提供了参考依据。

关键词

[核电厂](#) [安注系统支管](#) [数值模拟](#) [湍流模型](#) [温度振荡](#)

分类号

## Temperature Fluctuating in Pipelines of Nuclear Power Plant

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**Abstract** It is very important for the safety operation of a nuclear power plant to realize and prevent the thermal fatigue caused by temperature fluctuation. Based on a modified  $k-\varepsilon$  turbulence model, the temperature fluctuation phenomenon occurred as the cold water injecting into the hot-water branch pipe, which connected the emergency core cooling system (ECCS) with the main pipe, was simulated. The numerical results are in good agreement with the experimental ones, and further, the distribution of temperature fluctuating in the whole pipeline are obtained for better monitoring the thermal fatigue.

**Key words** [nuclear power plant](#) [emergency core cooling system](#) [branch pipe](#) [numerical simulation](#) [turbulence model](#) [temperature fluctuation](#)

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