

反应堆工程

HRTL-5自然循环稳态特性

王建军^{1,2}, 杨星团¹, 姜胜耀¹

1.清华大学 核能与新能源技术研究院 先进反应堆工程与安全教育部重点实验室, 北京 100084 [JZ] 2.哈尔滨工程大学 核科学与技术学院, 黑龙江 哈尔滨 150001

收稿日期 2007-1-9 修回日期 2007-5-2 网络版发布日期: 2008-5-20

摘要 基于一维两相四方程漂移流模型, 采用数值模拟的方法对5 MW低温核供热堆热工水力模拟回路(HRTL-5)的自然循环稳态特性进行模拟, 分析了HRTL-5自然循环流量特性及其参数效应。结果表明: 1) 漂移流模型比均相流模型更适用于HRTL-5; 2) 当系统压力为1.5 MPa时, 系统自然循环流量随加热热流密度的升高而增加; 3) 当系统压力为0.5 MPa时, 系统自然循环流量随加热热流密度的升高先增加后减小; 4) 自然循环流量随加热段入口欠热度的升高而减小; 5) 当加热热流密度较低时, [JP3]系统自然循环流量随压力的升高而减小, 当加热热流密度较高时, 系统自然循环流量随压力的变化呈现复杂状况。

关键词 [稳态特性](#); [自然循环](#); [两相流动](#); [HRTL-5](#)

分类号 [TL33](#)

Steady-State Behaviors of Natural Circulation in HRTL-5

WANG Jian-jun^{1,2}, YANG Xi ng-tuan¹, JIANG Sheng-yao¹

1. Key Laboratory of Advanced Reactor Engineering and Safety of Ministry of Education, Institute of Nuclear and New Energy Technology, Tsinghua University, Beijing 100084, China; 2. College of Nuclear Science and Technology, Harbin Engineering University, Harbin 150001, China

Abstract Based on the one dimension two-phase drift flow model, the simulation of steady-state behaviors of natural circulation in HRTL-5 was performed. The natural circulation characteristic of HRTL-5 and its parameter effects were analyzed. The results show that the drift flow model is more suitable for describing the behaviors of HRTL-5 than homogeneous model. When the system pressure is 1.5 MPa, the natural circulation flow rate (NCFR) of the system increases with the increase of the heat flux. Moreover, when the system pressure is 0.5 MPa, the NCFR of the system increases first and then decreases with the increase of the heat flux. With the subcooling of the entrance fluid at heated section increases, the NCFR of the system decreases. Finally, with the increasing of system pressure, the NCFR of the system decreases at lower heat flux and exhibits complex features at higher heat flux.

Key words [steady-state behaviors](#) _ [natural circulation](#) _ [two-phase flow](#) _ [HRTL-5](#)

DOI

通讯作者

扩展功能

本文信息

▶ [Supporting info](#)

▶ [\[PDF全文\]\(428KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“稳态特性; 自然循环; 两相流动; HRTL-5”的相关文章](#)

▶ [本文作者相关文章](#)

· [王建军](#)

· [杨星团](#)

· [姜胜耀](#)