



顺载和管径对管内水沸腾两相流流动性的影响

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Effects of driving load and pipe diameter on flow characteristic of two-phase boiling water

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摘要

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摘要 利用地面转台旋转产生的离心力模拟飞行过载,并在此过载作用下进行了不同管径内沸水两相流实验.通过改变过载大小、管径、沸水流量等参数,得到沸水流动特性的初步变化规律,并对顺载作用下沸水的流型进行了拍摄.结果显示顺载和管径对沸水的流动会产生明显的影响.顺载作用使管内出现了一些新流型,并且增加了流动的不稳定性.压差随顺载的增大而减小,且管径越大其减小的程度越大.实验结果增加了动载下管道内工质流动特性的数据积累,同时对飞行器上蒸发循环制冷系统的理论分析和设计提供一定的借鉴和参考.

关键词: 顺载 管径 沸水 实验研究

Abstract: The centrifugal force resulted from a rotational platform was used to simulate the flying load and the experiment of two-phase boiling water flowing in different diameter pipes under driving load was conducted. By changing the parameters, such as driving load, pipe diameter, flow rate, and so on, some flow characteristics of the boiling water were obtained. The image of flow patterns under dynamic load was obtained with a video camera. The results reveal that the dynamic load whose direction is the same as the flow direction and pipe diameter dramatically influence the flow characteristic of the boiling water. Some new flow patterns were observed under dynamic load. In addition, the dynamic load weakens the flow stability of the boiling water. The greater the dynamic load, the lower the pressure drop. And for a bigger diameter pipe, the pressure drop will decrease more obviously. The experimental data can be added to the database in the flow characteristic of gas-liquid two-phase pipe flow under dynamic load, and can be a reference in developing the vapor-cycle cooling system for flying vehicles.

Keywords: driving load pipe inner diameter boiling water experimental research

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