原子能科学技术 2009 43 (第5期): 426-430 ISSN: 1000-6931 CN: 11-2044/TL

反应堆工程

水平流动沸腾近壁汽泡滑移速度预测及分析

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收稿日期 2008-2-26 修回日期 2008-4-22 网络版发布日期: 2009-5-20

摘要 滑移汽泡对提高通道内的换热有重要作用，为建立合理的机理模型，需深入了解滑移汽泡的运动特征。通过对水平流动沸腾下近壁滑移汽泡进行受力分析，研究建立了滑移汽泡动量守恒方程，通过数值求解，获得了近壁滑移汽泡的速度，并与Maity的试验数据进行了比较分析，两者符合较好。模型预测结果表明：随着时间的增长，滑移汽泡的速度逐渐增加，但增加的趋势逐渐变缓；汽泡浮升时，滑移汽泡的速度低于当地液相的速度，表明在该情况下，曳力和汽泡生长所产生的附加质量力为汽泡滑移的动力，剪切升力为汽泡浮升的动力。

关键词 滑移汽泡；速度；预测模型；水平流动沸腾

分类号 TL334；TK124

Prediction Model and Analysis for Velocity of Sliding Bubble Near Wall in Horizontal Flow Boilin

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Abstract The sliding bubble plays an important role to enhance heat transfer. The secret understanding of the sliding bubble motive characteristic is required in order to constitute the reasonable mechanism models. The momentum equation on the sliding bubble was established according to the analysis of forces acting on the sliding bubble in horizontal flow boiling, and the velocity of the sliding bubble was obtained by numerical solving method. The prediction results were compared with the experimental results of Maity, and they agree very well. The velocity of the sliding bubble increases with increasing time, but the increase of the sliding velocity for bubble decreases gradually. The velocity of the sliding bubble is less than that of the local liquid, which shows that the drag force and add-mass force due to bubble expansion are driving force to make the bubble slide along the wall, and the shear lift force is driving force to make the sliding bubble lift off the wall.

Key words sliding bubble velocity predicting model horizontal flow boiling

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