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传递现象

R410A-油混合物在7 mm强化管内流动沸腾的换热特性

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摘要

实验研究了环保替代制冷工质R410A-润滑油混合物在强化管内的流动沸腾换热特性，探索了质流密度、干度和平均油浓度对换热特性的影响。实验测试管为内螺纹强化管，长度为2000 mm、外径为7.0 mm。实验结果表明，纯制冷剂R410A的传热系数随干度的增大先增大后减小，峰值出现在干度为0.7～0.8左右;对于R410A-油混合物，在干度小于0.5的工况下，油的存在增强换热，在干度大于0.6的高干度情况下，传热系数随平均油浓度和干度的增大迅速降低。基于混合物性开发了R410A-油混合物在7 mm强化管内流动沸腾的换热关联式，新的关联式预测值与89%的实验数据的误差在±30%以内，平均误差为17.3%。

关键词

R410A 油 强化管 流动沸腾 换热 关联式

分类号

Heat transfer characteristics of flow boiling of R410A-oil mixture in a 7 mm enhanced tube

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Abstract

An experimental study of heat transfer characteristics of flow boiling of R410A-oil mixture in an enhanced tube was performed to investigate the influence of mass flux，vapor quality and oil concentration on heat transfer coefficient.The test tube was internally spiral grooved tube，the length of the test tube was 2000 mm，and the outside diameter was 7.0 mm.The test results showed that the heat transfer coefficient of R410A initially increased with vapor quality and then decreased，presenting a local maximum in the vapor quality range between 0.7 and 0.8.The presence of oil enhanced heat transfer coefficient when vapor quality was less than 0.5.When vapor quality was higher than 0.6，heat transfer coefficient decreased rapidly with increasing nominal oil concentration and vapor quality.A new heat transfer coefficient correlation of flow boiling of R410A-oil mixture inside 7 mm enhanced tube was developed based on the mixture properties，and it agreed with 89% of experimental data within deviation of ±30%，and the mean deviation was 17.3%.

Key words

R410A oil enhanced tube flow boiling heat transfer correlation

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