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TRANSPORT PHENOMENA & FLUID MECHANICS

水平和倾斜管内气液分层流界面稳定性

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摘要 A viscous Kelvin-Helmholtz criterion of the interfacial wave instability is proposed in this paper based on the linear stability analysis of a transient one-dimensional two-fluid model. In this model, the pressure is evaluated using the local momentum balance rather than the hydrostatic approximation. The criterion predicts well the stability limit of stratified flow in horizontal and nearly horizontal pipes. The experimental and theoretical investigation on the effect of pipe inclination on the interfacial instability are carried out. It is found that the critical liquid height at the onset of interfacial wave instability is insensitive to the pipe inclination. However, the pipe inclination significantly affects critical superficial liquid velocity and wave velocity especially for low gas velocities.

关键词 two-fluid model Kelvin-Helmholtz criterion interfacial instability gas-liquid stratified flow

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Stability of stratified gas-liquid flow in horizontal and near horizontal pipes

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Key words two-fluid model; Kelvin-Helmholtz criterion; interfacial instability; gas-liquid stratified flow

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