

Convective Boiling of CO₂ in Macro and Mini-Channels

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Abstract : The present work deals with the theoretical and experimental investigation of the convective boiling of CO₂ in macro and mini-channels. A review of the state of the art of convective boiling studies in mini-channels and conventional channels for operating with CO₂ was carried out, with special attention to the flow patterns and pressure drop maps in single-phase and two-phase flows. To carry out an experimental analysis of the convective boiling of CO₂, a properly instrumented experimental bench was built, which allows a parametric analysis for different thermodynamic conditions, such as mass velocities between 200 and 1300 kg/(m².s), pressures between 20 and 70bar, temperature monitoring at the entrance of the mini-channels, heat flow and pressure drop in the test section. The visualization of flow patterns was possible with the use of a high-speed CMOS camera. The results obtained are in line with those found in the literature, both for flow patterns and for the heat transfer coefficient.

Keywords : carbon dioxide, convective boiling, CO₂, mini-channels

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