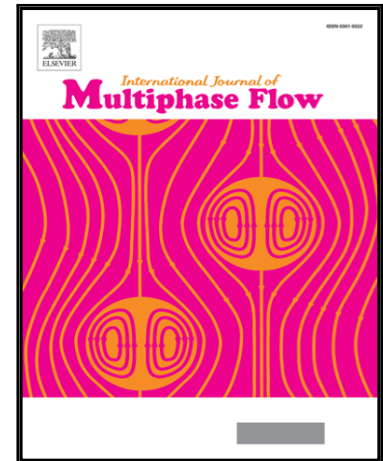


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Air - Water flow through a single serpentine mini channel –Flow distribution and Pressure drop

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Abstract

In the present paper, flow patterns and pressure drop characteristics during air-water flow through a single serpentine mini channel have been studied. Ring flow and slug flow have been observed to be the dominant flow patterns. The flow patterns are majorly surface dominated however, effect of gravity is present at low phase velocities. The pressure drop in vertical orientation is found to be higher than horizontal. Horizontal orientation is more prone to non-uniform distribution of flow regimes.

Key words: Air-water flow, serpentine channel, flow pattern, pressure drop

1. Introduction:

Gas-liquid flows in mini-channels and micro-channels have received a great deal of attention due to their wide applicability in advanced and modern science applications like Micro-Electro-Mechanical Systems (MEMS), electronic cooling, chemical process engineering, fuel cells, medical and genetic engineering, bioengineering. One such potential application is Proton exchange membrane fuel cell (PEMFC). Due to its low operating temperature (30⁰C to <100⁰C) range water vapor often condensed or entered through porous gas diffusion layer (GDL) to form different air –water flow distributions inside gas flow channels. The unevenly distributed water in the gas flow channel results in non-uniform distribution of reactants on the electrode surface area which in turn lowers the cell performance (Quan et al. 2005). Water management and its

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