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Experimental Characterization of Inter-channel Mixing Through a Narrow Gap JACK BUCHANAN¹, Bechtel Marine Propulsion Corp., SIMO MAKIHARJU, University of Michigan, ALEXANDER MYCHKOVSKY, KEVIN HOGAN, KIRK LOWE, Bechtel Marine Propulsion Corp., STEVEN CECCIO, University of Michigan — Mixing through narrow gaps that connect primary flow paths is an important flow process for many thermal-hydraulic applications, such as flow through nuclear reactor rod bundles or heat exchangers. The flow in a narrow gap can exhibit periodic flow structures due to travelling vortices. These flow structures in the gap, as well as any pressure gradient across the gap, have a significant effect on the rate of mixing between the primary flow paths. To investigate such flows in detail, and to develop validation quality data sets for comparison with CFD, we have conducted a canonical inter-channel mixing experiment between two channels, with a $(127\text{ mm})^2$ cross-section. The channels were connected by a gap 914.4 mm long in the stream-wise direction and 50.8mm wide in the cross-stream direction. The gap height could be varied from 0 to 50.8 mm. The flow speed in both channels could be independently varied to have $Re = (40\text{ to }100) \times 10^3$. The integral mixing rates were determined by injecting fluorescent dye into one of the channels well upstream of the test section and by measuring the dye concentration at the channel inlets and outlets. Additionally, the flow fields in the gap and channels were measured with LDV and PIV.

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