

Abstract Submitted
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Time Resolved 2D X-Ray Densitometry of a Ventilated Partial Cavity Closure¹ SIMO MAKIHARJU, STEVEN CECCIO, University of Michigan

— A time resolved x-ray densitometry system was developed to measure the spatial distribution of void fraction for nominally two-dimensional flows. The system can image a region of $(15 \text{ cm})^2$ at a frame rate of up to 4000 fps. The source was a rotating anode type normally used for cineradiography and angiography. Supplied by a 65 kW high frequency generator with a high speed starter, it could be operated at up to 433 mA at 150 kV. The imager subsystem comprised of a high speed camera coupled with a high resolution image intensifier. The range of measured void fraction can be changed to span a desired range yielding an uncertainty on the order of 1% of the measurement range. The system is used to examine the void fraction field in the closure region of a ventilated partial cavity behind a backward facing step. The cavity has Reynolds number of $O(10^5)$ based on the cavity length, and a non-dimensional gas flux of $Q^* = 0.0048$. The bubbly flow created in the cavity wake is examined using the x-ray densitometry system, dual fiber optical probes, and high speed cinematography. The local void fraction and bubble size distributions in the cavity wake are determined, and the measurements methods are compared.

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