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Proper Orthogonal Decomposition on Experimental Multi-phase Flow in a Pipe BIANCA VIGGIANO, Portland State University, MURAT TUTKUN, Institute for Energy Technology, Kjeller Norway, RAL BAYON CAL, Portland State University — Multi-phase flow in a 10 *cm* diameter pipe is analyzed using proper orthogonal decomposition. The data were obtained using X-ray computed tomography in the Well Flow Loop at the Institute for Energy Technology in Kjeller, Norway. The system consists of two sources and two detectors; one camera records the vertical beams and one camera records the horizontal beams. The X-ray system allows measurement of phase holdup, cross-sectional phase distributions and gas-liquid interface characteristics within the pipe. The mathematical framework in the context of multi-phase flows is developed. Phase fractions of a two-phase (gas-liquid) flow are analyzed and a reduced order description of the flow is generated. Experimental data deepens the complexity of the analysis with limited known quantities for reconstruction. Comparison between the reconstructed fields and the full data set allows observation of the important features. The mathematical description obtained from the decomposition will deepen the understanding of multi-phase flow characteristics and is applicable to fluidized beds, hydroelectric power and nuclear processes to name a few.

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