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Characterization of Turbulence and Cavitation Induced Pipe Vibrations Due to Flow thru Baffle Plates GAVIN HOLT, DANIEL MAYNES, JONATHAN BLOTTER, Brigham Young University — We report experimental results characterizing pipe vibrations caused by turbulent flow and cavitation due to water flow through baffle plates mounted in a 10.2 cm diameter schedule 40 PVC pipe test section of a closed water flow loop. The baffle plates contained varying hole sizes that ranged from 0.159 cm to 2.54 cm, with the total through area, or openness, of each baffle plate ranging between 11% and 60%. Pipe wall acceleration data was collected for a range of Reynolds numbers from 5-85 x 10^4. Acceleration measurements were acquired at locations along the pipe from 3-110 diameters downstream of the baffle plate. The measurements show that vibration levels at a given streamwise position increase with larger holes size, a decrease in openness, and increased flow rate. The incipient point of cavitation was observed to occur at decreasing flow rate with increasing hole size and decreasing openness. Vibration levels decreased asymptotically with increased distance downstream of the baffle plate for all scenarios and the streamwise distance at which the vibration level was attenuated increased as the hole size increased, openness decreased, and flow rate increased. The downstream vibration level also increased with these parameters.

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