

Abstract Submitted
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An Experimental Study of Oscillating and Pulsating Flow in a 2-D Diffuser using TRPIV¹ CAMERON KING², BARTON SMITH³, Utah State University — Separating oscillating and pulsating flow in 2-D diffusers of various angles is studied experimentally. Time-Resolved PIV measurements and simultaneous pressure measurements reveal that during the accelerating portion of the cycle, the flow may remain attached in spite of a very large adverse pressure gradient. Separation is observed to begin high in the diffuser and propagate downward. Separation is found to occur earlier in the cycle with increasing displacement amplitude. The time-varying pressure measurements are used to determine the resultant minor losses for the flow in each direction. These measurements, together with the velocity measurements, are used to calculate the acoustic power dissipation and acoustic impedance. The minor losses and acoustic power dissipation are found to be a decreasing function of the Reynolds number and an increasing function of displacement amplitude. The impact of the addition of a steady-flow component in the direction of increasing flow area is assessed, as well as the effect of diffuser angle.

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