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One-Dimensional Analysis Techniques for Pulsed Blowing Distribution[1] FRANK CHAMBERS, KALYANASUNDARAM KRISHNAN, MAE, Oklahoma State University — Pulsed blowing offers reductions in bleed air requirements for aircraft flow control. Efficient pulsed blowing systems require careful design to minimize bleed air use while distributing blowing to multiple locations. Pulsed blowing systems start with a steady flow supply and process it to generate a pulsatile flow. The fluid-acoustic dynamics of the system play an important role in overall effectiveness. One-dimensional analysis techniques that in the past have been applied to ventilation systems and internal combustion engines have been adapted to pulsed blowing. Pressure wave superposition and reflection are used with the governing equations of continuity, momentum and energy to determine particle velocities and pressures through the flow field. Simulations have been performed to find changes in the amplitude and wave shape as pulses are transmitted through a simple pulsed blowing system. A general-purpose code is being developed to simulate wave transmission and allow the determination of blowing system dynamic parameters.

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