

**ACOUSTICAL PROPAGATION IN 2D LINED DUCT WITH FLOW.
NUMERICAL SIMULATIONS AND MEASUREMENT**

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The measurement of liner impedance with flow is a very difficult problem especially when the liner is not a simple SDOF liner. To bypass the problem of knowing the acoustical propagation inside the liner, a method called "education method" has been developed at NASA. The propagation of sound inside a 2D lined duct is computed through a finite elements method, with the assumptions of uniform flow and of acoustical displacement continuity over the lined section. An inverse method is then used to determine a value of the impedance that minimizes the discrepancy between predicted and measured acoustic pressure at some characteristic points. We propose a new method called "Multimodal Impedance Method" to compute the propagation in a 2D lined duct with flow. The basis of this method is to project the propagation equations on a complete basis of functions. A Riccati equation for the multimodal impedance matrix is found. The transmission and reflection matrices can then be computed easily. The MIM is much more quicker than a finite elements method. The axial boundary conditions in the MIM are exact and easy to implement. Furthermore, the effect of the boundary layer of the main flow can be taken into account. The result of this method is compared to a finite elements calculation. Those numerical results are compared to experimental results measured in a set up with a rectangular section. An inverse method can also be used to find the best fit of impedance. The boundary condition along a lined wall is also in question.