driver to the acoustic system of the waveguide. To circumvent this issue, frequency response measurements are made between a neutrally buoyant velocity sensor suspended in the fluid and an accelerometer mounted to the active face of the driver. In effect, the measurement decouples the two systems and provides the standing wave resonance frequencies of the duct having ideal boundary conditions.

12:00

3aPAa12. Sound propagation in a conical duct with flow. Rudolf N. Starobinski (Lab. d'Acoustique, URA 6613 CNRS, Univ. du Maine, av. O. Messiaen, BP 535, 72085 Le Mans, Cedex 9, France, starob@univ-lemans.fr)

The variations of acoustical exergy and acoustical mass velocity are used for a description of three-dimensional sound propagation in quasi one-dimensional moving medium in a conical duct of a different cross-sectional shape. Solution for the sound propagation in this system is represented by the solution for a matched slightly deformed conical waveguide without flow (reciprocity part of the propagation) corrected by nonreciprocity time delay that takes into account convection of the sound by flow. Equivalent circuit for a sound propagation in a conical duct is represented by two successive separate elements: reciprocity one, which describes a sound propagation in the matched waveguide, and a nonreciprocity part represented by the element of nonreciprocity delay. For the particular dependencies of the cross-sectional area against duct axis, the solution for propagating sound is found as two propagated noninteracted advancing and backward waves. The Green's functions and equivalent circuits for internal and external sound excitations are found as their decomposition by the eigenmodes of the matched waveguide.

Contributed Poster

This poster will be on display in the Poster Gallery from Thursday to Friday, 18–19 March. Author will be at the poster from 10:00 a.m. to 12:00 noon on Thursday, 18 March.

3aPAa13. A new acoustic conductor. Fathy Shenoda and Albeer Shenoda, Jr. (Dept. of Acoust., Natl. Inst. for Standards, Tersa St., El-Haram, El-Giza, Code 12211, P.O. Box 136 Giza, Egypt, abdo@tqc.nis.sci.eg)

A new acoustic conductor was designed and experimentally studied. This conductor consists of a perfectly rigid pipe of constant cross-section area and is treated at its side wall with a small gradually perforated area. This experimental study aimed to determine its behavior and to outline the design procedures for optimizing its performance. The parameters (reflection coefficient r, normalized acoustic resistance R, and reactance X, at the conductor inlet) characterize the matching performance of the conductor, and were measured for different configurations and at different conditions. The design parameters such as the length, the graduality factor with which the side-perforated area increases, the function with which the side-perforated area is changed and reaches a maximum width D_m at the end of the conductor, as well as the conductor cross-diameter, were separately studied in detail at different conditions. The conductor design is optimized at the conditions: The conductor terminates at a point where almost all the sound energy has been released. Within the effective frequency range, r, R, and X have the following values: $r=0.1$, $R=1$, and $X=0$. The extensive experimental study and the great number of measurements at different conditions lead to an empirical formula for the calculation of cut-off frequency f_c and optimum D_m.

WEDNESDAY MORNING, 17 MARCH 1999 ROOM MA005, 8:00 TO 11:20 A.M.

Session 3aPAb

Physical Acoustics: Nonlinear Motion of Bubbles and Drops II

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Invited Papers

8:00

3aPAb1. The Rayleigh-like collapse of a conical bubble. Tim G. Leighton and Ben T. Cox (Inst. of Sound and Vib. Res., Univ. of Southampton, Southampton SO17 1BJ, UK, tgl@isvr.soton.ac.uk)

This paper describes an experimental investigation of the collapse of a conical bubble, with measurement of the liquid and bubble gas pressures, and sonoluminescence, generated during the collapse. A theoretical analysis, based on the 1917 formulation of Rayleigh, adequately predicts the pressures, and the time scales as measured by high-speed photography, within the limitations of both theory and measurement. One implication of this novel apparatus lies in the ability to control the inertia associated with the liquid without changing its other properties. The inertia is key to the dynamics of the type of bubble collapse which is associated with sonoluminescence and the emission of strong rebound pressures into the liquid. Another implication of this study is the ability to image the collapsing meniscus and the gas and, to a certain extent, place sensors within the gas of the collapsing bubble.