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An Experimental Study of the Open End Correction Coefficient for Side Branches within an Acoustic Tube.

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Abstract

The open end correction coefficient (OECC) of acoustic tubes has been widely investigated under free field conditions. However, no experimental data have given accurate OECC values for side branches within an acoustic tube. To provide experimental data for modeling the vocal tract, a number of mechanical acoustic models were used to examine the effects of the angle of the branch axis, and the proximity of the main tube around the open end of the branch. The OECC was estimated for each case by finding the optimal match between the measured and computed transfer functions of the tubes for both the peaks and troughs. The results indicate

that the OECC depends on L/D^2, where L is the cross-dimension of the main tract at the branching point, and D is the branch diameter. For side branches connected to the main tract by a narrow neck, the OECC of each end of the neck is determined by the ratio of the radius of the neck to that of the adjacent section. Two empirical equations for evaluating the OECC within a tract were derived from the present study. Finally, the range of appropriate OECC values for estimating accurate vocal tract transfer function was discussed, based on the results presented here and on morphologic measurements previously reported.

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