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From the Bell Telephone Laboratories, Murray Hill, N.J.

Digital Computer Calculation of Glottal Volume Velocity

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Abstract

The acoustic volume flow through the vocal cords during voiced speech is described by non-linear differential equations. The equations are of second order and have time-varying coefficients which represent the acoustic resistance and inductance of the glottis. The resistance is approximated by a function of glottal area and glottal flow. The inductance is only a function of glottal area. Difference equation approximations are made of the continuous relations, and the difference equations are programmed for solution in a digital computer. The results show the relative influence of viscous and kinetic factors upon the form of the glottal wave. In addition, the formulation permits analysis of the effects of air density, with glottal pressure and acoustic load of the vocal tract.

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Discussion

Denes (Murray Hill): In comparing the volume velocities at the vocal tract's driving point when the glottis is loaded with the tract and when it is short-circuited, you only showed volume velocity wave shapes. Quite often, the spectrum changes are more instructive than the wave shape changes, and I am wondering whether you have also calculated the spectrums of the waveshapes you showed in your slides.