

Finite Element Method Analysis of Occluded-Ear Simulator and Natural Human Ear Canal

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Abstract : In this paper, we discuss the propagation of sound in the narrow pathways of an occluded-ear simulator typically used for the measurement of insert-type earphones. The simulator has a standardized frequency response conforming to the international standard (IEC60318-4). In narrow pathways, the speed and phase of sound waves are modified by viscous air damping. In our previous paper, we proposed a new finite element method (FEM) to consider the effects of air viscosity in this type of audio equipment. In this study, we will compare the results from the ear simulator FEM model, and those from a three dimensional human ear canal FEM model made from computed tomography images, with the measured frequency response data from the ear canals of 18 people.

Keywords : ear simulator, FEM, viscosity, human ear canal

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