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FEM Analysis of an Occluded Ear Simulator with Narrow Slit Pathway

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Abstract : This paper discusses the propagation of sound waves in air, specifically in narrow rectangular pathways of an occluded-ear simulator for acoustic measurements. In narrow pathways, both the speed of sound and the phase of the sound waves are affected by the damping of the air viscosity. Herein, we propose a new finite-element method (FEM) that considers the effects of the air viscosity. The method was developed as an extension of existing FEMs for porous, sound-absorbing materials. The results of a numerical calculation for a three-dimensional ear-simulator model using the proposed FEM were validated by comparing with theoretical lumped-parameter modeling analysis and standard values.

Keywords : ear simulator, FEM, simulation, viscosity
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