

Time-Domain Model of the Inner Ear to Study Nonlinear Responses

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Abstract

The ear doesn't solely listen but it also speaks. Sounds formed in the inner ear which are measurable in the outer ear are called Otoacoustic emissions (OAEs). Some claim these are produced by the outer hair cells (OHCs), the amplifiers in the inner ear. Our hypothesis is that the OHCs only amplify distortion products (DPs) but do not produce them.

This is investigated by testing the following technique:

- 1) Solving for different frequencies in the frequency domain
- 2) Construct a superposition of these solutions and use them as initial values for the time domain
- 3) Generating a spectrum of the vertical motion of the basilar membrane and look for "extra" frequency content