Simulation of bone-conducted sound pathways to the outer and middle ear
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Abstract
• The problem: Bone conducted sounds may contribute to hearing loss despite use of hearing protection.
• Identify paths of bone conducted sound.
• Determine frequency dependency of bone conducted sound.
• Simulate occlusion effect and determine its frequency dependency.

Numerical approach
• CT scan of dry skull.
• Digitally insert soft tissue and earplugs into CT scans of skull.
• Use pixel information in FTFE program. Uniform grid.
• Broadband pulsed input at mastoid.
• Explicit time-stepping. Optimized on teragrid using MPI.

General:
• Main constituent of bone conduction is due to vibrations on the skull surface.
• Results conform to evidence that bone conducted hearing loss occurs mostly at frequencies below 1kHz (near the skull’s resonant frequencies.)

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