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Impact of spherical probe scattering on estimation of acoustic vector quantities. (A)

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Impact of spherical probe scattering on estimation of acoustic vector quantities. (A)

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Multimicrophone probes are often used to measure energy-based acoustical quantities. In some cases, these probes consist of microphones mounted on the surface of a sphere, which, due to the high level of symmetry, permits scattering effects to be better characterized. Scattering of a plane wave incident on a rigid sphere has been modeled to observe how particle velocity and intensity calculations are affected by the presence of the sphere. These effects have been investigated for the traditional “finite-difference” method and a recently developed “wave vector” estimation method. In the computer model, 3-D surface plots were made showing the calculated error as a function of angle of the incident plane wave and frequency. It is shown that using the wave vector method and purposefully orienting the probe in the planar sound field generally results in the most accurate measurements. [Work supported by NASA Stennis Space Center and STI Technologies.]

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