

Three-Dimensional Jet Refraction Simulation Using a Gradient Term Suppression and Filtering Method

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Abstract : In the applications of jet engine, open-jet wind tunnel and airframe, there widely exists a shear layer formed by the velocity and temperature gradients between jet flow and surrounded medium. The presence of shear layer will refract and reflect the sound path that consequently influences the measurement results in far-field. To investigate and evaluate the shear layer effect, a gradient term suppression and filtering method is adopted to simulate sound propagation through a steady sheared flow in three dimensions. Two typical configurations are considered: one is an incompressible and cold jet flow in wind tunnel and the other is a compressible and hot jet flow in turbofan engine. A numerically linear microphone array is used to localize the position of given sound source. The localization error is presented and linearly fitted.

Keywords : aeroacoustic, linearized Euler equation, acoustic propagation, source localization

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