FM5S_13016

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Correlation of Nearfield Pressure with Mixing Layer Velocity in a Supersonic Jet

François Coiffet, **Joël Delville**, Carine Fourment, Peter Jordan, Patrick Braud

Laboratoire d'Études Aérodynamiques, UMR-CNRS 6609, Poitiers, France

A series of experiments have been performed to investigate the possibility of using a linear stochatic estimation to reconstruct the three dimensional turbulence field of an isothermal supersonic jet using only a limited series of nearfield pressure measurements. To this end synchronous measurement of the nearfield pressure and the mixing layer velocity field has been effected, using a two-component LDV system in parallel with 39 pressure transducers arranged along the jet. Pressure-pressure and velocity-pressure correlations are obtained for an extensive range of locations in an isothermal jet with a Mach number of 1.4. Additional pressure measurements are performed in a region where the energy of the hydrodynamic and acoustic fields are of similar order, and preliminary results clearly identify both convective and propagative trends. This database will be used to reconstruct the temporal evolution of the three dimensional velocity field and also to filter and separate the acoustic and hydrodynamic components of the nearfield pressure.

View the extended summary