NUMERICAL STUDY OF SUPERSONIC FLOW PAST A CYLINDRICAL AFTERBODY

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Abstract

The near wake of a cylindrical afterbody aligned with a uniform Mach 2.46 flow has been numerically investigated using Reynolds-Averaged Navier-Stokes equations (k-epsilon two equation model) and Large Eddy Simulation (dynamic sub-grid scale eddy viscosity model). Mean flow field properties obtained from numerical simulations, such as axial velocity, pressure on the base surface has been compared with the experimental results. It has been found that k-epsilon model fails to predict the flow properties in the recirculation region where better agreement has been observed between the data obtained from LES and measurements. Data obtained from LES has been further analyzed to investigate the turbulent flow field in the wake region. Parameters like turbulent kinetic energy and primary Reynolds stress have been calculated and compared with the results obtained from an experiment in order to achieve a better understanding of the role of turbulence in the flow field.