FM24L_10564

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

PDF Computation of Turbulent Flows with a New Near-Wall Model

Marta Wacławczyk[(1)], Jacek Pozorski[(1)], Jean-Pierre Minier[(2)]

(1) *Institute of Fluid-Flow Machinery, PAN, Gdańsk, Poland*
(2) *Research and Development Division, Electricité de France, Chatou, France*

The modeling and computation of near-wall turbulent flows is addressed with the probability density function (PDF) method for velocity and the turbulent frequency. Near-wall extensions are considered in detail and a new model for viscous transport is proposed. A method of elliptic relaxation for a blending function is applied in the PDF approach to model the pressure-strain term. A numerical integration scheme is developed to deal with the near-wall singularity of coefficients that appears in the discrete formulation. The PDF equation is solved by a Monte Carlo method and the whole approach appears as a self-contained Lagrangian simulation using stochastic particles. For the sake of numerical example, the fully developed channel flow case at $Re_\tau = 395$ and $Re_\tau = 590$ is computed; results are compared with the available DNS data.

View the extended summary