A NUMERICAL MODEL FOR TURBULENT CHANNEL FLOW UNDER THE INFLUENCE OF ROTATION

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ABSTRACT

A mathematical model for turbulence, which includes turbulent velocity/pressure-gradient effects and accounts for rotational influences, is presented. An important finding of the analytical development is that the rotational contribution to the velocity/pressure-gradient mechanism is identically zero. This leaves only an explicit term to represent rotational influences in the Reynolds stress equation. In a preliminary step the model is used to simulate a non-rotational turbulent wind tunnel flow. Results of this simulation indicate good agreement between observed and computed Reynolds stress components. In a more advanced step the model is used to simulate the internal 90% of a rotational turbulent channel flow. Final simulations for both the mean flow profile and the Reynolds shear stress indicate good to excellent agreement between observed and computed results.