

THE EFFECT OF POWER-LAW INDEX ON THE TURBULENCE FEATURES OF TURBULENT PIPE FLOW

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ABSTRACT

The present study set out to reveal the influence of the flow behaviour index of the power-law fluid on the main features of the turbulence in especially at the vicinity of the wall. Toward this end, a large eddy simulation (LES) with a standard dynamic model has been devoted to a fully developed turbulent flow of pseudoplastic and dilatant fluids through an isothermal stationary pipe, at a simulation's Reynolds number of 4000. The emerged of this study suggest that the decreased flow behaviour index induces a pronounced enhancement in the generation of the axial turbulence intensities and a reduction in the transfer of these axial intensities to the tangential and radial intensities, The decreased flow behaviour index leads also to decrease the turbulent kinetic energy and to ameliorate the transport of the axial radial and tangential turbulence intensities from the vicinity of the wall towards the core region. Moreover, the skewness and flatness of the axial velocity fluctuations are almost independent of the flow behaviour index along the radial direction.

Key Words: *LES, Turbulent flow, Shear-thinning, Shear-thickening, Fully developed, Turbulence statistics.*