Theoretical modeling of turbulent flow in a fully-developed rotating square duct ZHAOHUI QIN, RICHARD PLETCHER — The theoretical modeling of flows in rotating duct can be traced back as early as to the 1970s. However, most researches focused on laminar flows. The current research tried to model the flow field in a turbulent rotating square duct. In a rotating duct, an Ekman layer comes into being near the side wall because of the balance between Coriolis force and pressure gradient. Near the stable wall, due to the inertial effect, a Stewartson layer appears. It is possible to solve the flow field close to the side and stable walls by either a similarity solution or an asymptotic solution. At the unstable wall, due to the turbulence and flow instability, a vortex shows up and has important impact on the total drag. The current research tries to give some clues to model the three layers.

Zhaohui Qin

Date submitted: 14 Aug 2005   Electronic form version 1.4