

Heat transfer by Görtler vortices developed on a wall with finite conductivity

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Görtler vortices are streamline vortices that appear in a flow over a concave wall as a result of centrifugal instability. They have a strong influence on the heat transfer. The purpose of this study is to model the heat transfer enhancement by those vortices using a weakly nonlinear analysis. The energy equation is dissociated from the momentum and the continuity equations, by neglecting the buoyancy force, so no natural convection occurs in this study. The heat transfer is involved using a thermal conduction equation inside the thick conductive wall and a thermal advection-diffusion transfer in the fluid motion. Computations of basic state coupled with spatial first and second order perturbations provide this heat transfer enhancement, at the fluid-wall interface, as a function of the Prandtl number, the dimensionless wall thickness and the thermal conductivity ratio between the wall and the fluid.

Références

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