Heat transfer enhancement by the Goertler vortices developed on a wall with a finite thermal conductivity[1] INNOCENT MUTABAZI, HARUNORI YOSHIKAWA, JORGE PEIXINHO, LYES KAHOUADJI, LOMC, UMR6294, CNRS-Université du Havre — Görtler vortices appear in a flow over a concave wall as a result of centrifugal instability [Saric, Annu. Rev. Fluid Mech. 26, 379 (1994)]. They may have a strong influence on heat transfer [Momayez et al., Int. J. heat Mass transfer 47, 3783(2004)]. The purpose of this work is to model heat transfer by Görtler vortices using a weakly nonlinear analysis of Smith &-Haj-Hariri [Phys. Fluids A5, 2815(1993)]. We have investigated the coupling of the convective heat transfer by the stationary vortices with the heat conduction inside the solid wall. The finite thickness and thermal conductivity of the wall enter into the boundary conditions of the problem through the ratio δ of the wall thickness to the boundary layer thickness and through the ratio K of the thermal conductivities of the fluid and the wall. The parametric dependence $Nu(\delta, K)$ of the Nusselt number is performed and it is shown that found the heat transfer is quite well modified by these two parameters. The local thermal stress can be estimated in order to analyze the effects on ageing of the wall material.

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