

Numerical Analysis of Laminar Mixed Convection within a Complex Geometry

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Abstract : The study of mixed convection is, usually, focused on the straight channels in which the onset of the mixed convection is well defined as function of the ratio between Grashof number and Reynolds number, Gr/Re. This is not the case for a complex channel wherein the mixed convection is not sufficiently examined in the literature. Our paper focuses on the study of the mixed convection in a complex geometry in which our main contribution reveals that the critical value of the ratio Gr/Re for the onset of the mixed convection increases highly in the type of geometry contrary to the straight channel. Furthermore, the accentuated secondary flow in this geometry prevents the thermal stratification in the flow and consequently the buoyancy driven becomes negligible. To perform these objectives, a numerical study in complex geometry for several values of the ratio Gr/Re with prescribed wall heat flux (H2), was realized by using the CFD code.

Keywords : complex geometry, heat transfer, laminar flow, mixed convection, Nusselt number

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