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THE EFFECT OF RIB WIDTH ON THE LAMINAR NATURAL CONVECTION BETWEEN TWO VERTICAL PARALLEL ISOTHERMAL PLATES HEATED SYMMETRICALLY

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ABSTRACT Results of numerical study of laminar free convection and heat transfer in a vertical plane - parallel channel with two thin adiabatic ribs on its walls are presented. The channel had the open inlet and outlet, and its surfaces were maintained at the same temperature. The channel height was unchanged with elongation parameter $A = L/w = 10$, and the ribs were located in the middle of the channel towards each other. Rib height $l/w = 0 \div 0.4$ and Rayleigh number $Ra = 10^2 \div 10^5$ were varied in calculations. The effect of these parameters on the flow structure, temperature field, local and integral heat transfer, and gas flow caused by gravitational forces were analyzed in detail. Numerical analysis was based on the solution of the full Navier - Stokes and energy equations in two-dimensional, non-dimensional statement and Boussinesq approximation.

To determine the dynamic and thermal parameters at the inlet and outlet, the calculation was carried out with two large volumes attached to the inlet and outlet. The features of the flow and heat transfer at separated flow around the channel ribs were studied in detail in this work.

The values of local Nusselt number are identical for the flow nearby the two vertical walls, due to the effect of rib. Also mean Nusselt number varies from high values at the channel entrance at the bellow to small values nearby the rib and the channel exit, where the mean air temperature inside the channel tends to be constant due to heat transfer between the air flow and channel walls. Reynolds number values increase with the increase of values of Rayleigh number, due to buoyancy effects, and nearby the rib due to increase of velocity at the contraction area. It is established, that with increase of a parameter *Ra* heat transfer is reduced, but Reynolds' number between the plates, on the contrary, grows. The article discusses the impact of the ribs on the amount of gas flow through the vertical channel which is important in the engineering applications.Good agreements with the published papers were noticed.