# Abstract

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### NUMERICAL INVESTIGATION OF TURBULENT FLOW and HEAT TRANSFER OVER PARTIALLY OPEN CAVITIES: EFFECT OF OPENING RATIO

Partially open cavities are encountered in various engineering systems such as electronic cooling devices and cooling for gas turbine blades, instead of conventional film cooling slots. Flow is to be imparted over the partially open cavity where it induces a shear layer and a shear driven vortex within the cavity, which is subjected to cooling effect at its wall. Depending on the opening ratio, heat and mass transfer occur between the main flow and the trapped vortex through the shear layer. In the present study, RANS simulations of such flow have been conducted for circular and square cavities to investigate the effect of opening ratio on the heat and mass transfer characteristics. The simulations were established on a rigorous numerical approach and proper validation with LDV measurements of turbulent flow in circular cavity. Based on the hydraulic diameter of the cavity, opening ratios ranging from 0.2 to 1.0 were investigated for a Reynolds number of 3×105. Generally, the maximum Nusselt number (Nu) was achieved at higher opening ratios for both circular and rectangle cavities. On the other hand the maximum dimensionless temperature gradient (?) inside the cavity was achieved at L/D=0.2 for both cavity configurations.