

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Transient laminar opposing mixed convection in a symmetrically heated duct with a plane symmetric sudden contraction-expansion: Buoyancy and inclination effects¹ LORENZO MARTÍNEZ-SUÁSTEGUI, ENRIQUE BARRETO, ESIME Azcapotzalco, Instituto Politécnico Nacional, CÉSAR TREVIÑO, UMDI, Facultad de Ciencias, Universidad Nacional Autónoma de México, Sisal — Transient laminar opposing mixed convection is studied experimentally in an open vertical rectangular channel with two discrete protruded heat sources subjected to uniform heat flux simulating electronic components. Experiments are performed for a Reynolds number of $Re = 700$, Prandtl number of $Pr = 7$, inclination angles with respect to the horizontal of $\gamma = 0^\circ, 45^\circ$ and 90° , and different values of buoyancy strength or modified Richardson number, $Ri^* = Gr^*/Re^2$. From the experimental measurements, the space averaged surface temperatures, overall Nusselt number of each simulated electronic chip, phase-space plots of the self-oscillatory system, characteristic times of temperature oscillations and spectral distribution of the fluctuating energy have been obtained. Results show that when a threshold in the buoyancy parameter is reached, strong three-dimensional secondary flow oscillations develop in the axial and spanwise directions.

¹This research was supported by the Consejo Nacional de Ciencia y Tecnología (CONACYT), Grant number 167474 and by the Secretaría de Investigación y Posgrado del IPN, Grant number SIP 20141309.

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Date submitted: 24 Jul 2015

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