

COMPLEX PATTERNS IN 3D CONVECTION

Jose Manuel Redondo, J.M. Sanchez, O.B. Mahjoub
UPC Barcelona Tech., B5 Campus Nord, Barcelona 08034, Spain

Abstract

We present a thermoelectric driven heating and cooling experimental device in order to map the different transitions between 2 Dimensional convection in an enclosure and the 3 D complex flows. The size of the enclosure is of 0.2 x 0.2 x 0.1 m and the heat sources or sinks can be regulated both in power and sign (Redondo 1992). The thermal convective driven flows are generated by Seebeck and Peltier effects in 4 wall extended positions of 0.05 x 0.05 cm each. The parameter range of convective cell array, varies strongly with the Topology of the Boundary conditions. At present side heat fluxes are considered and estimated as a function of Rayleigh, Peclet and Nusselt numbers, but the tilting possibilities of the BEROTZA built experimental device also allow to heat/cool at top and bottom. (Redondo and Garriga 1995, Redondo et al.1992)) Visualizations are performed by PIV, Particle tracking and shadowgraph.

Redondo J.M. (1992) Termodinámica de los procesos irreversibles, efectos termoeléctricos Rev. Termoelectricidad 2, 16-29.AIT.Pamplona.

Redondo J.M., Garriga J., Noriega G. (1992) Convective transfer. 11 ETC, Ed Rao KR. 147-154.

Redondo J.M. and Garriga J. (1995) Convection driven by thermoelectric heat fluxes. Mixing in Geophysical Flows (Eds. Redondo JM and Metais O. 343-352. CIMNE, Barcelona.

