

PAPER 14.2

FLOW FIELD CHARACTERISATION WITHIN A RECTANGULAR CAVITY

by

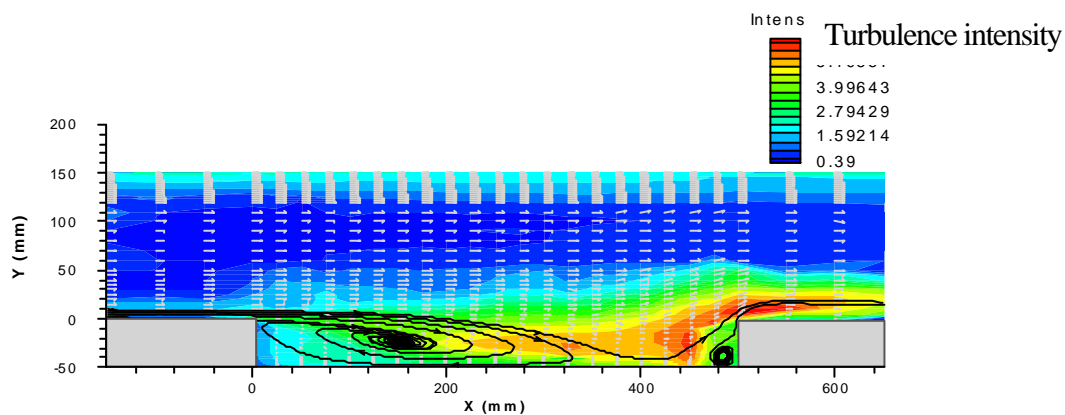
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ABSTRACT

In addition to engineering applications, the present experiment provides a useful database to validate numerical simulation codes at low Reynolds number and an interesting separated flow behaviour to provide insight on the flow physics.

The flow field within a rectangular cavity at low Reynolds number and for a length-to-depth ratio of 10 is described with a representation of velocity vectors and turbulence intensity. The “stagnation zone” in the flow is specially focused on and a detailed description of the flow evolution downstream and upstream from the cavity is given. These measurements show that no reattachment point exists at the bottom of the cavity but a sub-layer with negative axial mean velocity appears.

Reynolds stress profiles inside the cavity are presented with a spectral analysis of the LDV signals at the axial location of the stagnation point for a description of the behaviour of the sub-layer. For a complete description of the flow field, a comparison with backward facing flow data is conducted. The results show that the area including separated shear layer upstream from the stagnation zone is unaffected by the rearward facing step and, in the same time by the second recirculation zone.



Turbulence intensity and streamlines within the cavity ($U_0=20$ m/s)