# DYNAMIC AND THERMAL STUDY OF FLAPPING SLOT JET

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The objective of the project is to investigate the behavior of cold planar jet impinging on a V-shaped hot concave surface by means of flow visualization, pressure, velocity and temperature measurements and CFD simulation with Fluent. Having the experimental values, one can map the resulting pressure and convective heat transfer coefficient and compare them with the numerical predictions.

Data indicate that, in the presence of the V-shaped cavity, not only the large-scaled coherent structures in the shear layers exist in the jet, but also the whole jet column exhibits a prominent periodic flapping motion with a frequency $f_{flap}$ that depends on the exit velocity of the jet in case of a given geometry.

The tests are carried out on dedicated setup including jet produced by a slot nozzle and surface implemented with pressure taps and then with metallic thermofoil heated by Joule effect. The size, geometry, and standoff distance of the slot nozzle as well as the jet Reynolds number are parameters of the problem.

The main instrumentations used are the Free Surface Water Table to visualise the jet flapping and explain the physical reason of the phenomenon, High Speed Camera to track and measure the jet flapping by digital image processing of jet tracer, pressure transducer to obtain the unsteady pressure distribution, and the Infrared Camera to measure the surface temperature and determine the subsequent heat transfer coefficient.

Abreast Fluent simulation is conducted for comparison purpose. Finally global dimensionless correlations for Stanton number and distributions of Nusselt number are established.

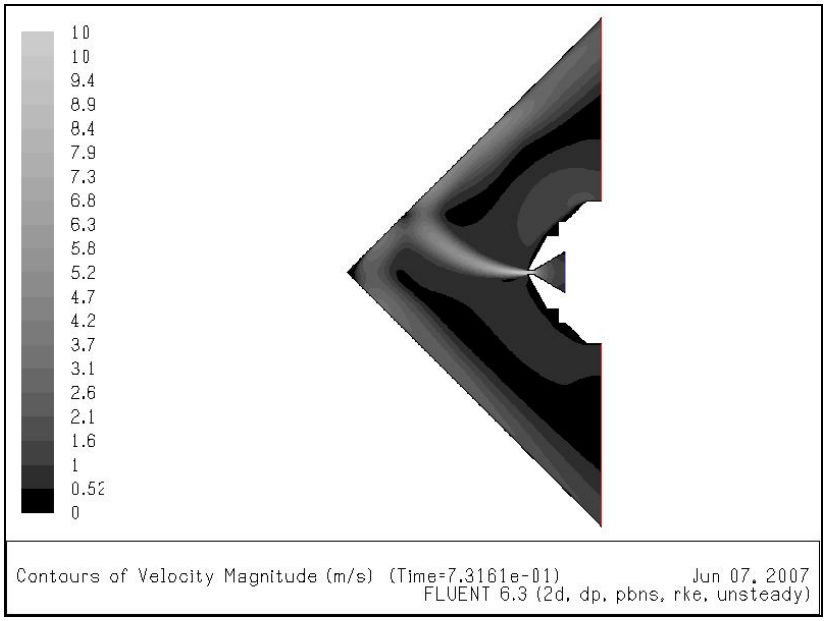


*Figure 1: CFD simulation of Flapping jet*