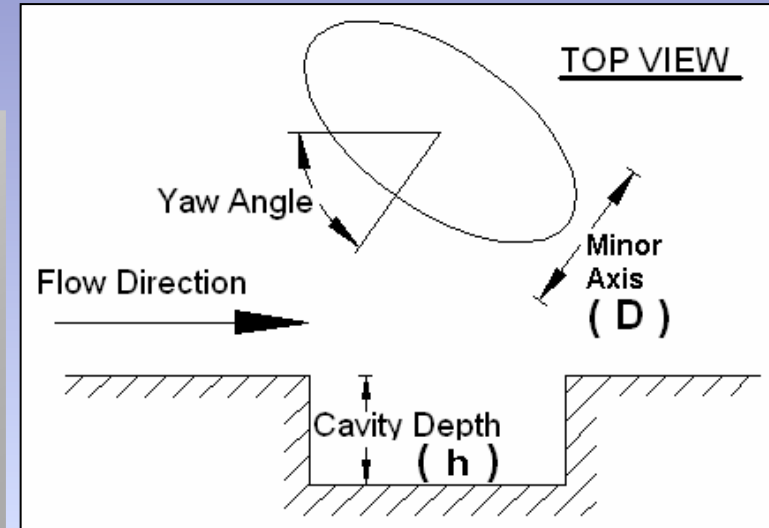


SIMULATION AND EXPERIMENTAL STUDY OF ELLIPTICAL CAVITY FLOW REGIMES

Background

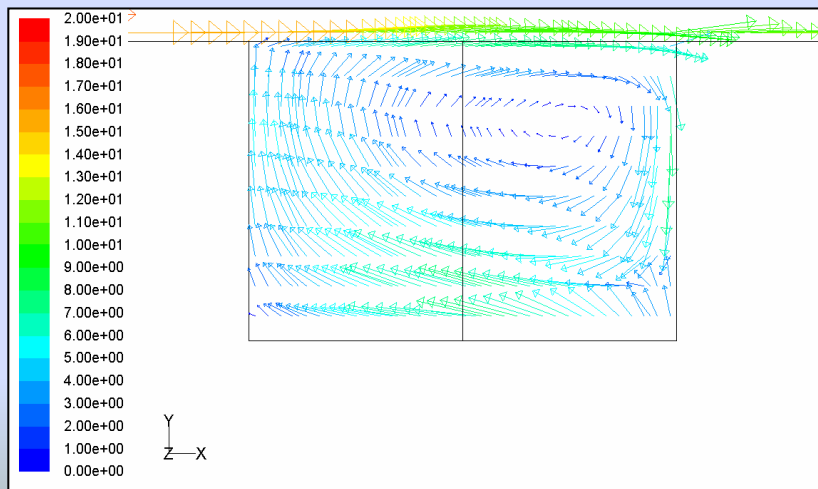
Cavities are a special type of surface irregularity which may cause unwanted drag, noise and structural vibration. Drag reduction is extremely important in many aerodynamic applications.



A typical elliptical cavity

Objective

- To study the elliptical cavity flow field for various yaw angles and cavity depths.
- To identify the cavity flow phenomena responsible for noise and unsteady loads.



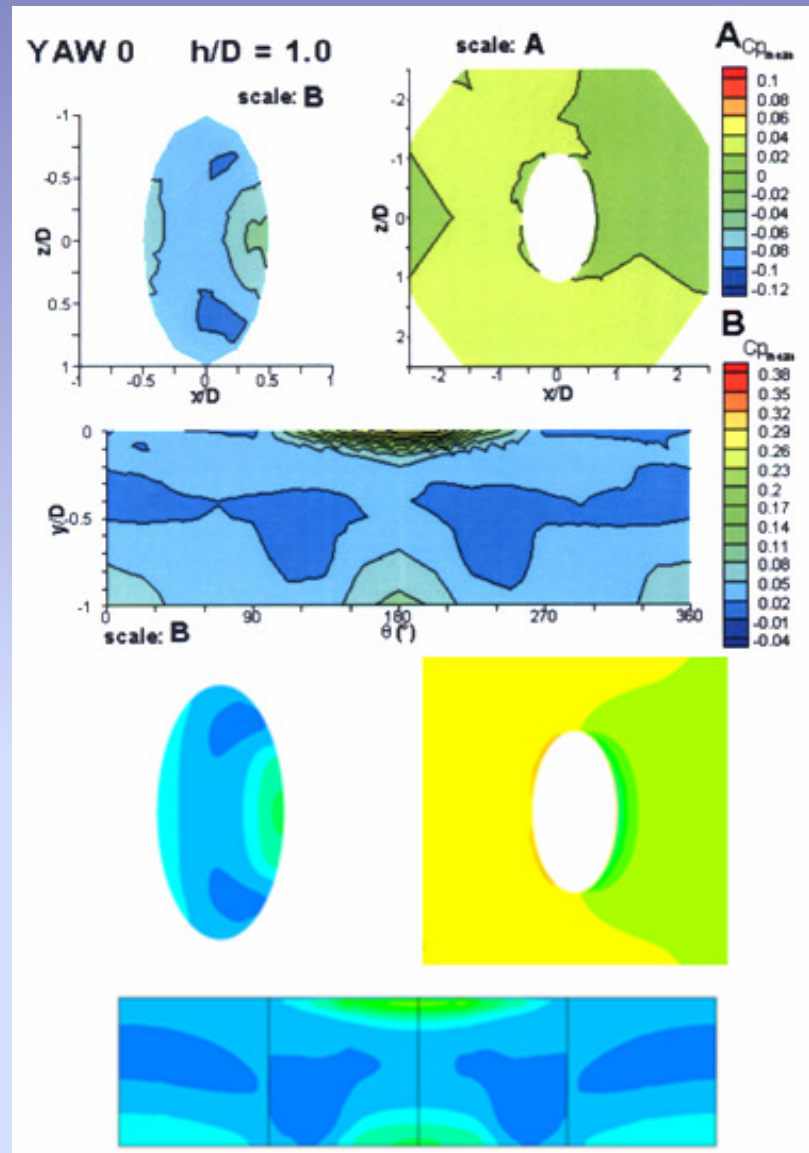
Velocity vectors showing a vortex formed inside an elliptical cavity

Research Carried Out

- Experimental measurement of elliptical cavity surface pressures and wake velocities.
- Numerical simulation of cavity flow regimes resulting from an oncoming boundary layer.

Findings and Future Work

- Pressure contours show distinct vortex structures and unsteady flow inside the cavity and in the wake.
- These phenomena will be studied in detail by appropriate experimental techniques (e.g. PIV) and simulated numerically.



A comparison of experimental measurements (top) and numerical simulation of C_p distribution inside and around an elliptical cavity (bottom)