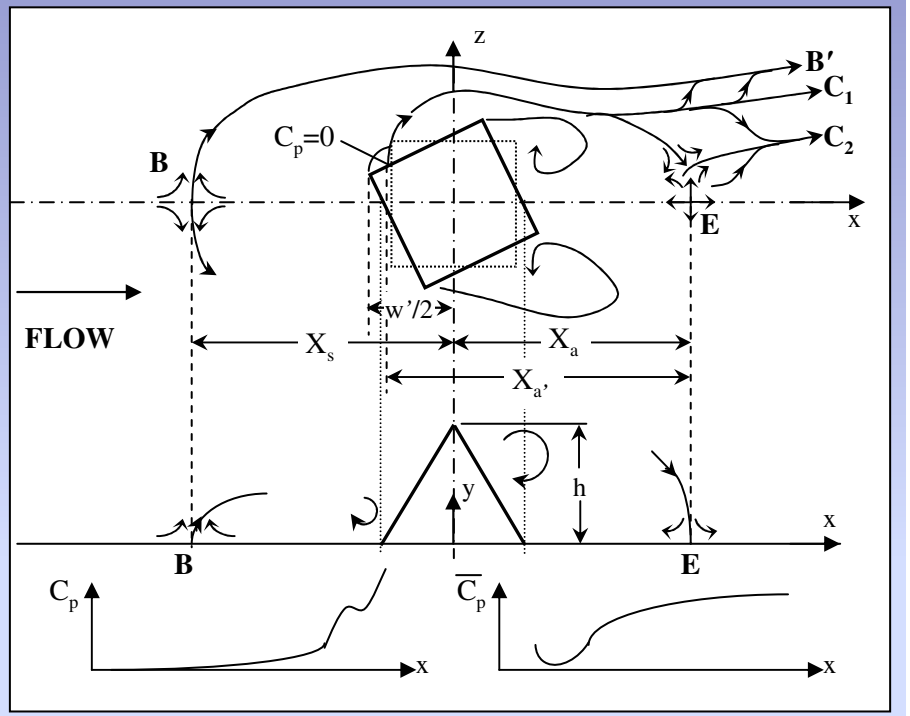
SCALING OF GROUND PLANE PRESSURE FIELD AROUND SURFACE-MOUNTED BLUFF BODIES

Background

Surface mounted bluff-bodies may have a range of different shapes and they play a role in areas like wind engineering, heat transfer from rough surfaces and aerodynamics.



Objective

To examine surface pressure distributions, together with flow topology (from oil-film visualization), in order to find whether there is any common ground plane pressure scaling for bluff bodies.

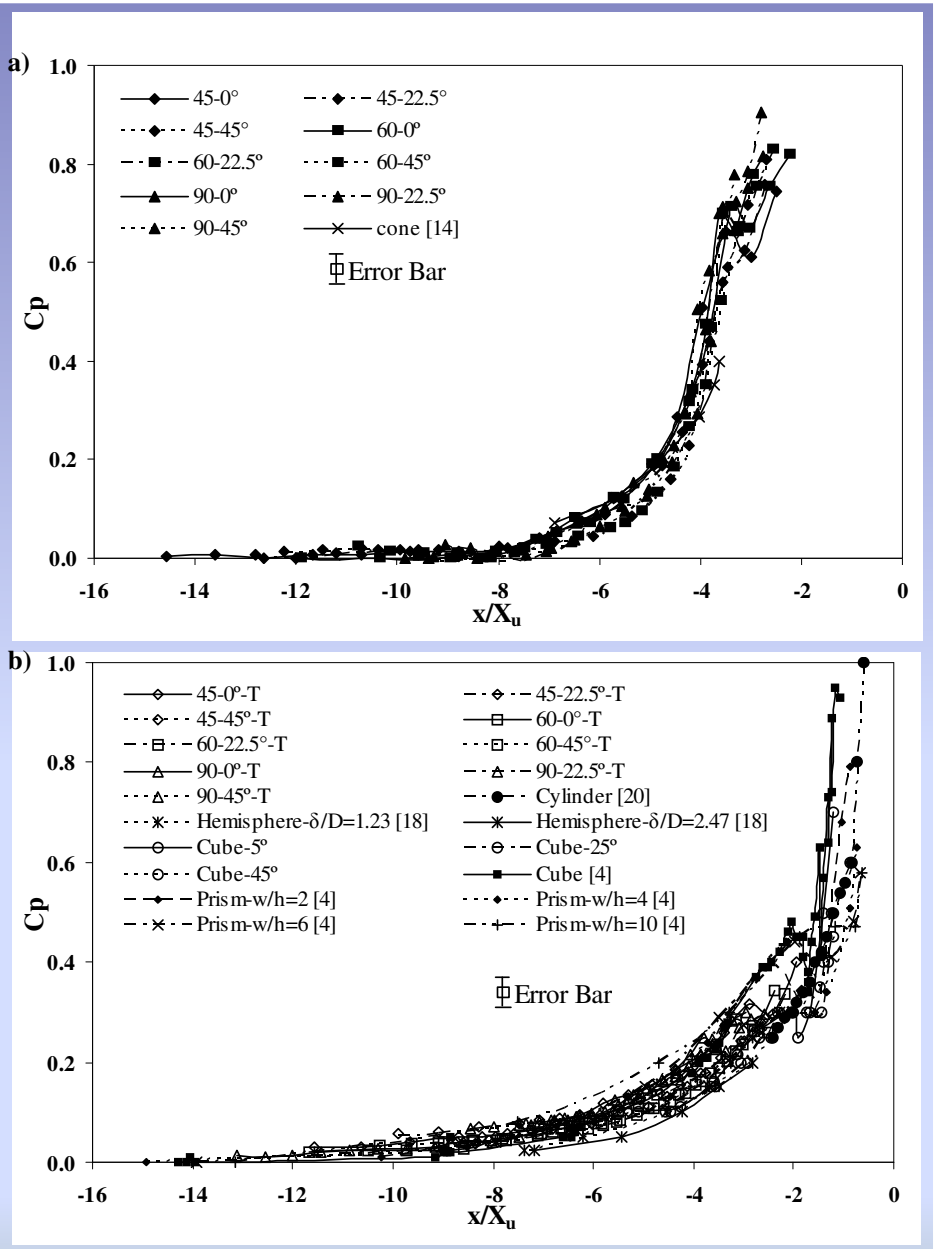
Scalings used for the upstream and downstream pressure fields, related to the mean pressure coefficient distribution (Cp) and the flow topology. Example shown here is for a low-rise pyramid

Research Carried Out

Wind tunnel oil-film and pressure measurements using pyramid models, plus assessment of data from other bodies in the literature.

Key Findings

A pressure field scaling method that collapses data from several body shapes has been found. The upstream scaling depends on the boundary layer thickness, whereas the downstream scaling is applicable to all the boundary layers assessed.



Upstream Cp distribution along z/h=0 with position scaled using X_u for bluff bodies in a) thin boundary layer, b) thick boundary layer