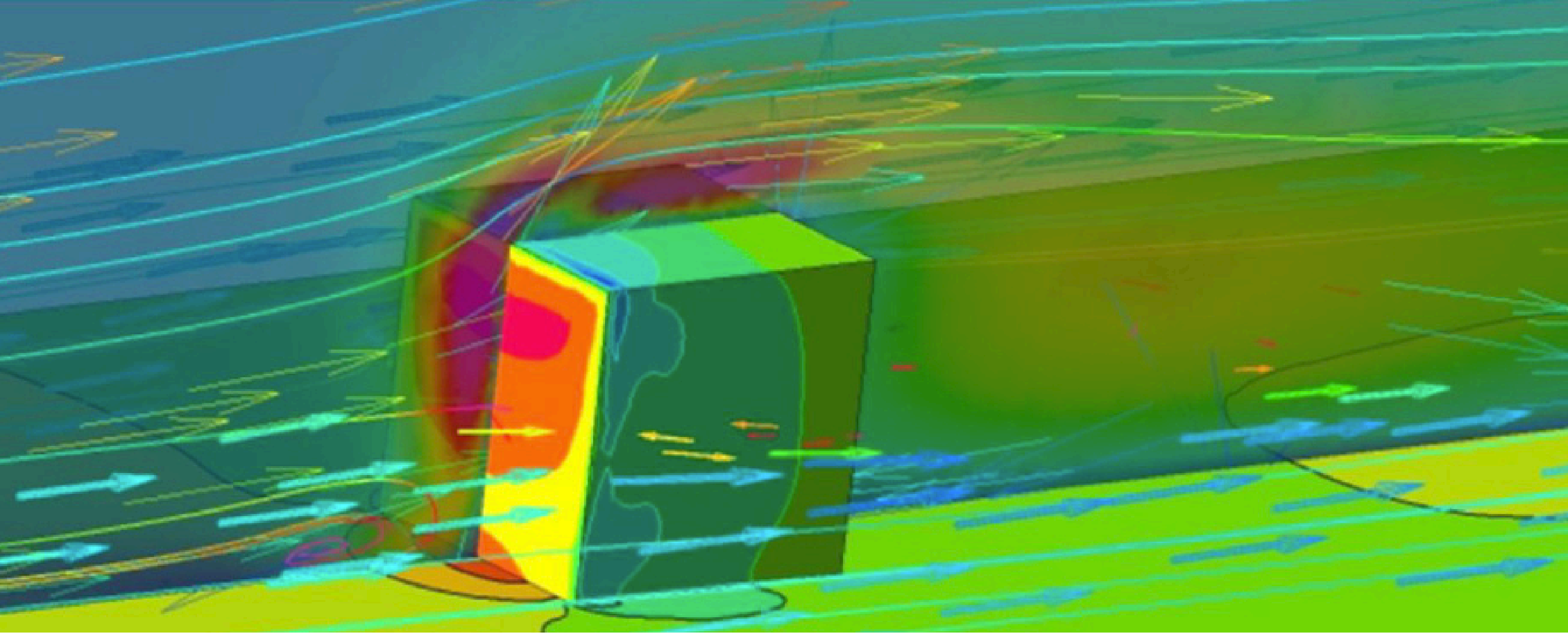


engineering airscience PTY LTD

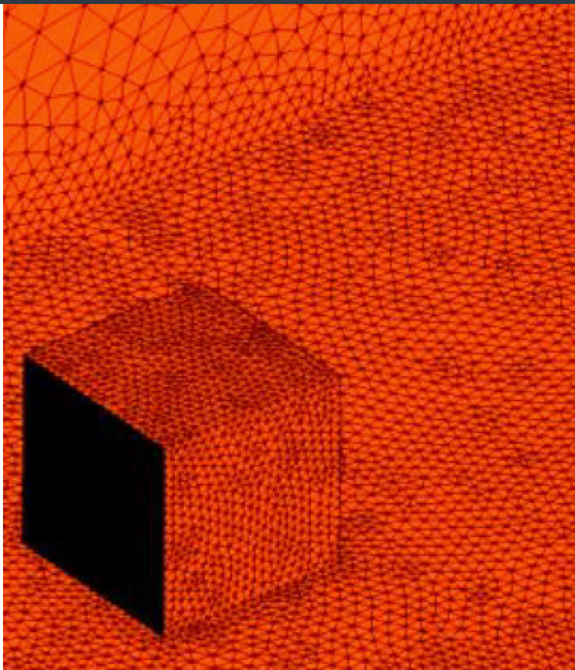
COMPUTATIONAL FLUID DYNAMICS

Computational Fluid Dynamics (CFD) is the branch of fluid mechanics that numerically solve the fundamental mathematical equations describing fluid behaviour. CFD can be applied to virtually any fluid mechanical issue, assisting to understand the fluid behaviour through provision of flow field detail in space and time. The approach is particularly beneficial in more complex configurations, where fluid behaviour is likely to depart from that predicted by typical empirically based design methods or when using such methods is simply not realistic.

Unlike physical model simulations, CFD provides detail of flow parameters across the full domain. A single simulation can provide details on plume dispersion, plume and ambient velocity fields and surface pressures; detail that would typically take many experiments within a wind tunnel investigation.

The flow of any single-phase fluid, (gas or liquid) can be described by a set of equations known as the Navier-Stokes equations. The Navier-Stokes equations are one of the most useful, yet complex equation sets. They can be used to describe many flow phenomena of interest, from the design of aircraft, cars, power stations and industrial equipment to the flow through arteries and the respiratory system or pollution in the environment.

The Navier-Stokes Equations do not provide an explicit relationship between the variables of interest, but rather a set of partial differential equations describing the rate-of change of the variables. Computers are then used to apply numerical methods, providing approximate solutions through the application of Computational Fluid Dynamics. Although there are many highly technical approaches to the application of CFD, the fundamental methodology of simulating a fluid flow follows the same basic procedure.



PRE-PROCESSING

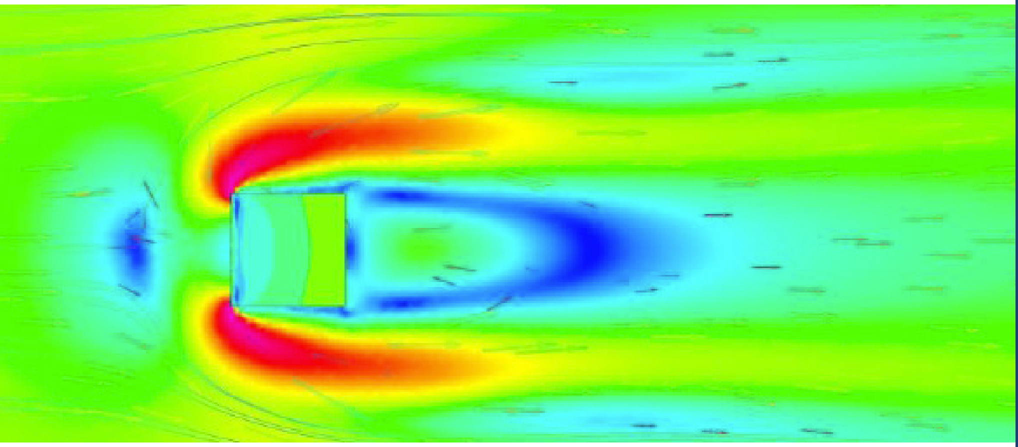
- » The geometry, representing the external limits or physical bounds of the problem, is virtually defined through the application of CAD.
- » The volume within the geometry, which represents the region occupied by the fluid, is divided into a mesh of discrete elements or cells.
- » The mathematical model is defined, typically a simplified form of the Navier-Stokes Equations that represent the important physics of the flow behaviour.
- » Boundary conditions, defining the fluid behaviour at the geometry boundaries, fluid properties and initial conditions, defining an initial flow state, are specified.

SIMULATION

- » Iterative numerical methods and procedures are used to solve the equation set for the defined fluid properties and boundary conditions, producing a steady state or transient solution.

POST-PROCESSING

- » Analysis and visualisation of the computational solution in space and time, extracting fluid flow detail to assist in development and design.



SERVICES

- » Complex Flow Modelling, CFD & Physical
- » Meteorological Modelling & Monitoring
- » Air Quality Modelling & Monitoring
- » Data Analysis & Statistics
- » Peer Review

Engineering Air Science couples knowledge gained through the application of physical modelling to complex flow and thermodynamic behaviour with experience in the application of CFD. We provide a unique expertise in the simulation of complex environmental, industrial or aerodynamic flows.

-EXPERIENCE-

Experience of over 20 year in fluid mechanics, investigating fluid flow behaviour and specialising in the atmospheric boundary layer, air quality and the modelling of complex flow and dispersion issues.

-KNOWLEDGE-

Knowledge gained through the application of diverse tools including field investigations, boundary layer and meteorological wind tunnels, steady-state and 3-dimensional regulatory dispersion models and more complex numerical dispersion and fluids modelling tools.

-EXPERTISE-

Expertise and insight gained through the unique physical and numerical simulation of some of the most complex physical states of the atmospheric boundary layer, improving understanding of boundary layer meteorology, complex flow and dispersive behaviour.

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