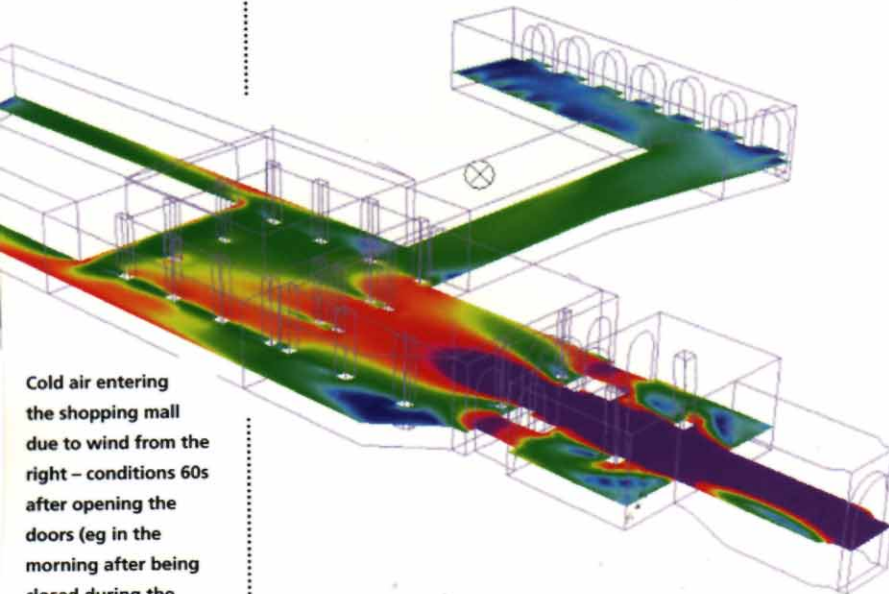


# HVAC simulations

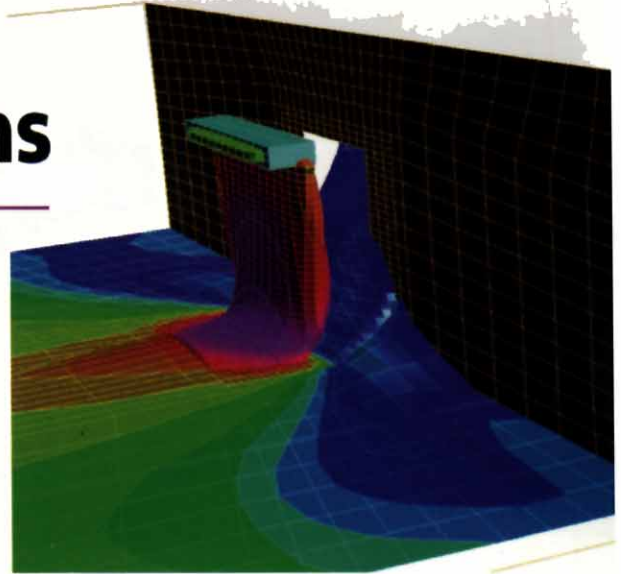
by **Alois Schaelin**, Air Flow Consulting, Switzerland

IN THEIR HVAC studies, Air Flow Consulting has been using CFX for the past four years, where they find it to be an invaluable tool for the prediction of air flow in buildings.

In a recent study, they investigated the extent of wind flow and draughts in a shopping mall which had been converted from a 100-year old building. There was particular concern over comfort as the owner intended to hold concerts in the mall and to have outdoor restaurant seating. The CFD study showed that these worries were well founded and that even at moderate external wind speeds, conditions would be quite uncomfortable for people to sit.



Cold air entering the shopping mall due to wind from the right – conditions 60s after opening the doors (eg in the morning after being closed during the night)



Cold air entering a shop with an air curtain installed 0.6m inside. Studies showed that the energy loss would be at least 50% lower if the air curtain was directly behind the entrance

The solution arrived at after further CFD investigations was: to install closing doors on all entrances; to limit outdoor tables to the warmer months; and for concerts, to close all but the main entrance.

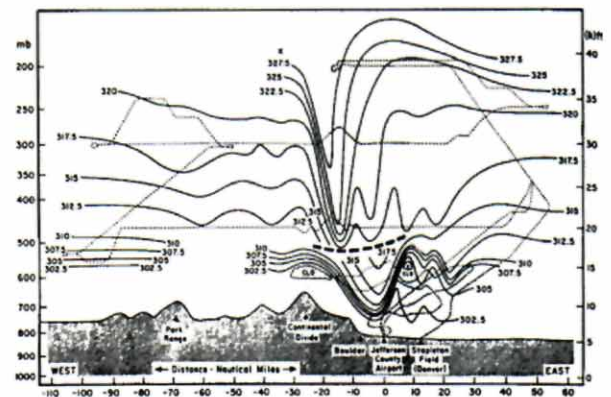
Another study, commissioned by the City Government of Zurich and concerned with staff comfort and energy conservation, assessed the feasibility of using air curtains in shop entrances rather than revolving or double doors. The study considered several designs of air curtain, and concluded that only in air-tight buildings could they be effective, and even then only if they were carefully designed and positioned. In leaky buildings, revolving doors were always found to be more energy efficient since, if they are airtight, there is no continuous flow path. However, such doors transport cold air into the building as they revolve, and some form of internal heating is still needed to maintain comfort in the immediate vicinity of the entrance.

# Stratified wind fields over complex topography

by **Christiane Montavon**, LASEN, Swiss Federal Institute of Technology, Lausanne, Switzerland

THE PREDICTION of local meteorological phenomena is of interest for many reasons. In addition to the fundamental understanding it yields, it can also have practical benefits, for example in the optimal siting of wind farms. We chose to use CFX for our simulations of atmospheric processes at scales

ranging from a few kilometres down to a hundred meters. A modified treatment of the thermodynamic equation was included, with buoyancy implemented using the Boussinesq approximation and a density profile corresponding to an atmosphere in hydrostatic equilibrium.



Observations of potential temperature for the Boulder windstorm

