3D POLLUTANT DISPERSION IN A URBAN STREET CANYON

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The pollutant dispersion to the free atmosphere in street canyons has been gained importance because it is directly related with the comfort and safety of the people living in urban environments. Up to now, many 2D-studies have been developed; the present case wants to study third component to check the 3D effects in a street canyon.

At the same time, it has been checked if there were changes of behavior using different small-scale models of the street canyon. Two different configurations, an aligned and a staggered configuration have been used to reproduce different urban environments.

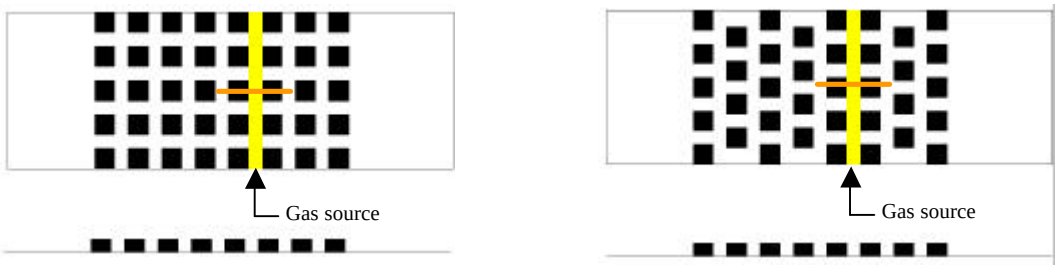

Figure 1: Sketch of the different configurations used

The study is composed of two main parts: a numerical and a experimental part. The experimental part was carried out in the L-2B wind tunnel equipped with a gas source coming from the bottom to simulate the pollutant emitted by the cars. To carry out all the measurements laser-based methods (PIV/PTV) were used. With theses techniques it allows to measure velocity, concentration fields, and turbulent mass flux vector that permits to define the degree of turbulent mixing of the flow.

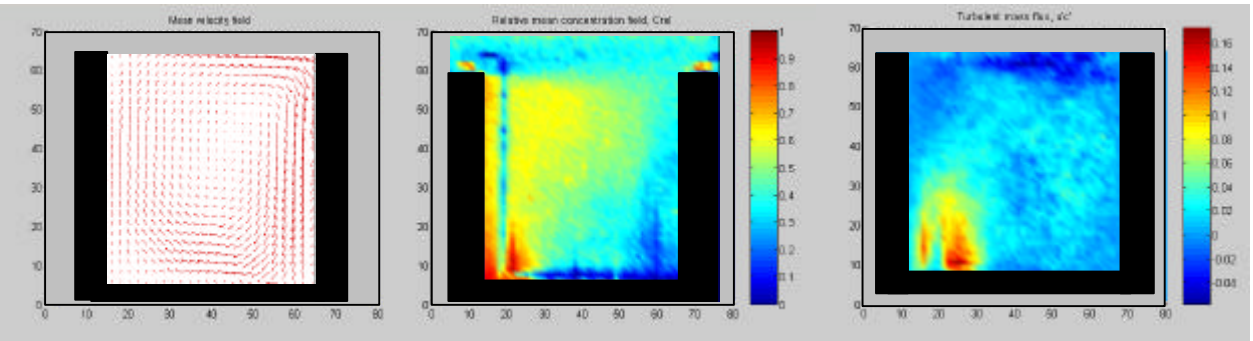

Figure 2: Plots of Velocity, concentration and turbulent mass flux fields

A numerical study is also carried out using the code FLUENT 5.5. The aim of the numerical study was to validate the results obtained experimentally. The advantage of the numerical simulations is that it allows us to have a better understanding of the behavior of the flow. It was found a different behavior of the flow changing the configuration. Stronger recirculations have been found, so better is the evacuation of the pollution for Staggered configurations and different behaviors are observed at different velocities making more efficient the evacuation of particles for lower velocities.