MEASUREMENT OF THE TURBULENT MASS FLUX WITH PTV IN A STREET CANYON

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Continuing the years long research on street canyons at VKI the project focused on the simultaneous measurement of

the mean velocity field and mean concentration field in an urban street canyon. The turbulent mass flux vector, u'c' is created by using the *same* PIV/PTV images for both velocity and concentration measurements.

The aim of the project was to check the correctness of the model used widely for the turbulent mass flux ($\overline{u'c'} \approx \nabla c$). The report presents the measured data and a comparison with the model.

Major problem to be solved was that of the line-source simulating the exhaust from cars: the source used for years showed different behavior from the reality. The pollutant was injected in a horizontal jet, which could be seen clearly on the processed images. In the frame of the current project a new line-source was designed and manufactured. The new source showed satisfying behavior in the preliminary tests. The distribution of the pollutant is homogeneous in the entire source exit. We can assume a 2D distribution.

The technique used for the measurements is "traditional" Particle Image/Tracking Velocimetry, but the processing of the images has two major steps: first processing of the velocity field and second the processing of the concentration field.

Images were taken for two different velocities at urban environment and open country as well. Two different roof geometries were tested. It was found that changing the roof geometry does not influence the dispersion significantly. Detailed discussion and conclusion on dispersion investigation is given in the report.



Figure 1: Turbulent mass flux vector at u = 6 m/s

Figure 2: RMS of concentration at u = 6 m/s