EXPERIMENTAL INVESTIGATION OF WIND EFFECT ON BUILDINGS

Yucel Ozmen, Turkey
Supervisors: J.P.A.J. van Beeck & P. Corieri

In this study, turbulent flow around buildings has been investigated experimentally. The model of the CSTC test building with a scale of 1:100 was studied for the different roof slopes with a various wind direction. The turbulent atmospheric boundary layer has been simulated using elliptic vortex generators and element of roughness in a tunnel flow. The mean velocity profiles and the axial component of the turbulent fluctuations have been measured around three dimensional roof models inserted in this simulated boundary layer.

Hot wire anemometry has been used to measure the velocity field. The reverse flow regions were determined on the roof models. From the mean velocity profiles measured on the roofs, the reverse flow region has been seen for $a = 0^{\circ},15^{\circ}$ in the windward side. For $a = 30^{\circ},45^{\circ}$, separation has started from roof ridge on the leeward side and with increasing roof slope, it is getting effective. Experimental results have been compared with numerical results obtained by H. Theias (DC 02/03) and good agreement has been shown in Figure 1. (a = roof slope)

Also, in the same time, with using two hotwires, the correlation between the atmospheric turbulence and the roof-induced turbulence was investigated. Hotwire positions can be seen in Figure 2. The correlation was found but less when flow is separated, i.e. on the leeward side for $a > 15^{\circ}$ in Figure 3.

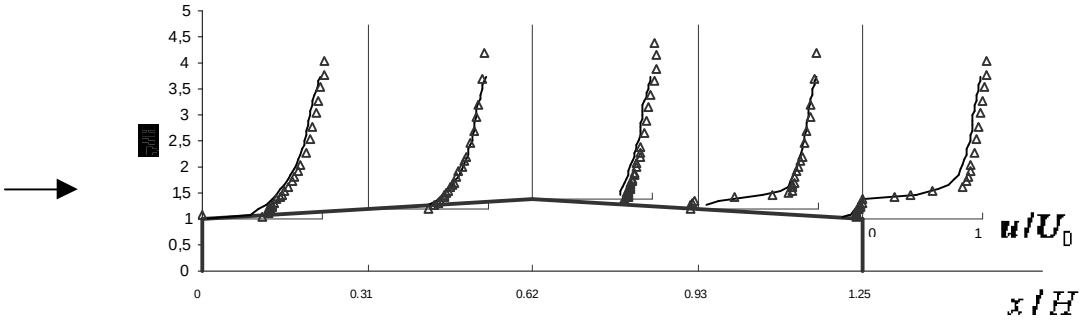

Figure 1: Experimental and numerical velocity profiles on the roof for $a = 30^{\circ}$

Figure 2: Hotwire positions

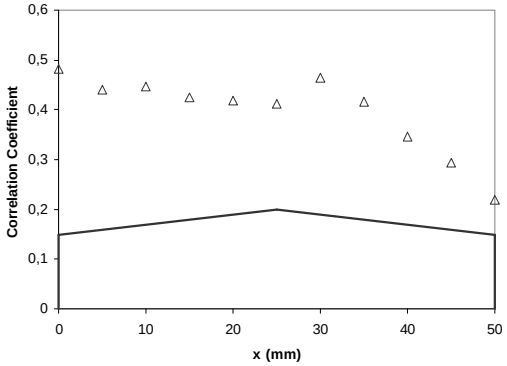

Figure 3: Cross correlation on the roof for $a = 30^{\circ}$