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Stereoscopic PIV Measurements in an Urban-type Boundary Layer¹ BRUNO MONNIER, BRIAN NEISWANDER, CANDACE WARK, DIET-MAR REMPFER, Illinois Institute of Technology — An experimental investigation of the flow through urban-type boundary layers (4 rows of 3 cuboid Plexiglas blocks) in a modeled atmospheric boundary layer, will be presented. This study utilizes SPIV, hot-wire and oil-film interferometry measurements. Hot-wire measurements provide input on the incoming flow while direct measurements of the wall shear stress are realized using oil-film interferometry. Flow dispersion in urban areas is highly 3-D; therefore, a 2D traverse system carrying the entire SPIV system was designed which allows us to precisely position the measurement plane. All three velocity components are measured in 2-D planes throughout the model. More than 300 data planes in a 102mm by 50mm by 500mm domain corresponding to the middle street of the urban model are presented. The spacing between adjacent planes is chosen in order to resolve details close to the edges of the blocks. 3D streamlines, vorticity contours, isosurfaces of the second invariant of velocity gradient and Reynolds stresses will be presented and serve as a unique database for the numerical model being developed in parallel at IIT (see talk by Kandala, Rempfer, Wark and Fischer).

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