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Large-eddy Simulation of Urban Boundary Layer Flow over Complex Topologies BYUNG-GU KIM, CHANGHOON LEE, Yonsei University — Boundary layer flows over arrays of regularly distributed obstacles and a scaled real urban area in which various wind directions are considered were investigated by wind-tunnel experiment and large eddy simulation. Virtual boundary method is employed to represent the immersed complex geometries. Inflow conditions are generated such that given profiles of mean wind and turbulence properties such as integral length or time scales are matched. Constant Smagorinsky subgrid-scale model is used. Surface flow parameters such as friction velocity (u_*), roughness length (z_0) and displacement thickness (d) were evaluated by changing wind direction. It was found that the parameters for the arrays composed of slender rectangular cylinders whose characteristics are similar to a real urban area than cube arrays are highly sensitive to the wind direction. Many previous works that have been focused on cube arrays would differ from the real urban area in the characteristics of flow field. Large-eddy simulations were extended to the region of Daejeon city, Korea to study the province's characteristics. Velocity profile along the street canyon with which a wind direction aligned were closed to a linear profile rather than a constant or exponential distribution. Detailed wind field characteristics above and below the canopy will be presented in the meeting.

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