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Large-eddy simulation of vortex streets and dispersion behind high-rise buildings BEOM-SOON HAN, Seoul Natl Univ, SEUNG-BU PARK, Columbia university, JONG-JIN BAIK, Seoul Natl Univ — Understanding flow and dispersion in densely built-up urban areas is one of the important problems in the field of urban fluid mechanics. Nowadays, sophisticated numerical models and high-resolution urban morphology data enable us to study detailed flow structures in real urban areas. Simulations with high-resolution urban morphology data show very complex flow structures in several studies. Here, we examine turbulent flow patterns and associated pollutant dispersion near and, particularly, behind high-rise buildings using the parallelized large-eddy simulation model (PALM) and high-resolution urban morphology data. The study area selected is a highly built-up area of Seoul, South Korea. It is shown that turbulent wakes are produced behind high-rise buildings and vortex streets appear in the places where turbulent wakes occur. The vortex street seems to be related to strong updrafts and ejections that appear downwind of high-rise buildings. The vortex street is found to affect pollutant dispersion. Various factors that influence the evolution and structure of vortex streets will be presented and discussed along with involved dispersion mechanisms.

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