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Quantifying the influence of geometrical details on urban canopy flow simulations YUNJAE HWANG, JORGE SOUSA, CATHERINE GORLE, Stanford Univ — Computational Fluid Dynamics (CFD) methods are frequently used to investigate urban canopy flows. Since it is not possible to represent the full complexity of these flows in a single deterministic simulation, there is a need to quantify the uncertainty in the results. In previous work, we have investigated uncertainties related to the inflow boundary conditions and the turbulence model. The results indicated that additional uncertainties are likely non-negligible, and that uncertainty in the representation of the urban canopy geometry could be an important factor. The objective of this study is to explore methods to quantify geometrical uncertainties in urban canopy CFD simulations. We consider a model of Stanford University's Science and Engineering Quad, and investigate the effect of the geometry by gradually introducing features with smaller dimensions into the model, and by introducing momentum sinks to represent the presence of vegetation. The geometrical changes result in some considerable differences, such as higher wind amplification factors near the buildings around the quad. Since such differences can affect design decisions related to e.g. pedestrian wind comfort or wind loading, future work will focus on establishing a more formal framework to quantify these uncertainties.

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