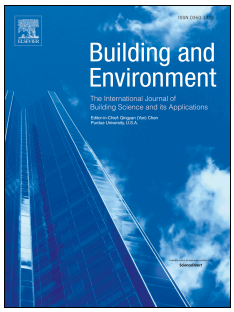
Accepted Manuscript



Predictive large eddy simulations for urban flows: Challenges and opportunities

C. García-Sánchez, J. van Beeck, C. Gorlé

PII: S0360-1323(18)30267-1

DOI: 10.1016/j.buildenv.2018.05.007

Reference: BAE 5445

To appear in: *Building and Environment*

Received Date: 4 February 2018

Revised Date: 7 April 2018

Accepted Date: 3 May 2018

Please cite this article as: García-Sánchez C, van Beeck J, Gorlé C, Predictive large eddy simulations for urban flows: Challenges and opportunities, *Building and Environment* (2018), doi: 10.1016/j.buildenv.2018.05.007.

Predictive Large Eddy Simulations for Urban Flows: Challenges and Opportunities

C. García-Sánchez[a,b,c,*], J. van Beeck[b], C. Gorlé[c]

[a] *EMAT, Department of Physics, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium*
[b] *von Karman Institute for Fluid Dynamics, Waterloosesteenweg 72, 1640 Sint-Genesius-Rode, Belgium*
[c] *Department of Civil and Environmental Engineering, Stanford University, 473 Via Ortega, Stanford, CA 94305, USA*

Abstract

Computational fluid dynamics predictions of urban flow are subject to several sources of uncertainty, such as the definition of the inflow boundary conditions or the turbulence model. Compared to Reynolds-averaged Navier-Stokes (RANS) simulations, large eddy simulations (LES) can reduce turbulence model uncertainty by resolving the turbulence down to scales in the inertial subrange, but the presence of other uncertainties will not be reduced. The objective of this study is to present an initial investigation of the relative importance of these different types of uncertainties by comparing urban flow predictions obtained using RANS and LES to field measurements. The simulations are designed to reproduce measurements performed during the Joint Urban 2003 field experiments. The time-averaged velocity measured at an upstream wind sensor is used to define the inflow boundary condition, and the results are compared to time-averaged measurements at 34 locations

*Corresponding author
Email address: cgarcia-sanchez@carnegiescience.edu (C. García-Sánchez)