

Abstract Submitted
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Large-Eddy Simulation of Atmospheric Boundary-Layer Gusts for Small Unmanned Air Systems¹ ROHIT KAMESHWARA SAMPATH SAI VUPPALA, Graduate student, Mechanical and Aerospace Engineering, Oklahoma State University-Stillwater, KURSAT KARA, Assistant Professor, Mechanical and Aerospace Engineering, Oklahoma State University-Stillwater — The Urban Air Mobility(UAM) concept involves safe and efficient transportation of goods and passengers over populated urban spaces using Unmanned Air Systems(UAS). Physical damage to goods and injuries to passengers, caused by unanticipated wind gusts is a major challenge for UAM and UAS. Predicting its occurrence in real-time continues to be a challenge for such low-altitude operating applications, especially in an urban terrain setting. Large Eddy Simulations(LES) have always helped researchers to closely study and understand the turbulent characteristics in different flow fields. In this work we aim to use LES with the intent to better understand and capture turbulent flow events observed in Atmospheric Boundary Layer(ABL) like gusts, over a terrain covered by urban canopy. Resolving the flow properties close to the roughness sub-layer (flow region in which the roughness has a direct influence) and inside the roughness canopy, might yield a better understanding of the phenomenon and hence is of great importance to us. Previous studies by researchers on topics like flow around low-rise buildings immersed in ABL, flow over a flat terrain covered by roughness blocks and many others, provide us with a good starting point and we would like to build upon this further for our work.

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