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Numerical Simulation of Surface Pressure Coefficient Over a Low-rise Building in Strong Winds ERICK SHELLEY, WEI ZHANG, Cleveland State University — The losses in billion-dollar disaster events in the U.S. are dominated by strong-wind caused damage and failure of civil structures. Low-rise buildings (residential homes, industrial and commercial buildings) are among the most vulnerable built structures, resulting in substantial economic losses and fatalities. Post-disaster surveys have shown that roofs' failure by separated flow and peak suction events accounts for most of the initial damage of these buildings. This research aims to simulate flow over a typical low-rise building under a uniform wind using the ANSYS/Fluent software. The focus is on the pressure coefficient distribution near the roof edges under various wind directions. The numerical model inputs and outputs are drawn from and compared to wind-tunnel tests of a 1:100 scaled Texas Tech University Wind Engineering Research Field Laboratory building. Reynolds Average Navier-Stokes (RANS) turbulence model is used to solve the flow, despite its limitation in the wake regions of the building. Various strategies are sought to reduce the prediction errors by comparing the model with the wind-tunnel tests. This work hopes to improve our understanding of rooftop vortices related to peak suction events and enhance wind design codification of low-rise buildings.

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