INFLUENCE OF A COMMUNITY OF BUILDINGS ON TORNADIC WIND FIELD

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To investigate the wind pressure on civil buildings under tornadic wind load, lots of laboratory and numerical simulation have been made to simulate the tornado-like vortices in the previous studies. However, most of them just placed only one civil structure and set up particles or blockages with small size around the building to simulate the roughness, which are similar with the scenario of rural area attacked by tornado. Actually, more damages have been made when tornado struck populated regions. However, this has been rarely studied. To bridge this gap, the community contained a number of buildings should be placed in the tornadic wind domain to simulate this kind of case. In this paper, a real world tornado, the Spencer, SD tornado of May 30, 1998 has been simulated to pass a community with a number of full size buildings by using CFD and this study systematically researches the changing of tornado wind domain when passing the community. For comparison, the case in which a straight line wind field with the same horizontal resultant wind speed in the tornadic wind domain at the roof height and the case without any structure in the tornadic wind domain are also simulated. Comparing with the case without any buildings in the tornado wind field, the results show that the traditional distribution of tangential velocity and pressure for the tornado have been destroyed when tornado passing community. The case of straight-line wind field also shows the increasing of wind speed around the buildings when presenting a community in it.