A NUMERICAL METHOD FOR NEAR-SURFACE TORNADIC WIND FIELD MODEL SIMULATION

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Existing methods of in-situ measurement struggle to capture near-surface wind speeds during a tornado. The demand for highly accurate near-surface tornadic wind fields for tornado-based design requires new methods of wind speed estimation, one of which is using post-disaster damage survey data. Information on tree-fall patterns included in damage survey data can and have been used as an indicator of the wind field. Thus, this paper develops a new analytical method for tree-fall analysis. This method, introduces a new parameter, eta (η), to describe the ratio of the critical wind velocity of tree failure to the translation speed of the tornado. Any desired wind field model can be applied to this analytical method and the parameters for the selected model can be estimated on the basis of tree-fall survey data as well as other information such as storm translation speed. In this paper, the tree-fall survey data of Joplin, MO, is used with this numerical method to generate the best-fit Rankine Vortex parameters, and some measure of validation is provided through the actual tree-fall pattern.