

Analysis of Time-Varying Characteristics of Simulated Turbulence in Wind Tunnel

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Abstract

Eight roughness configurations in Clemson boundary layer wind tunnel are presented. For these configurations, flow parameters such as turbulent intensities, integral length scales, large- and small- scale turbulence, and spectra of velocity components of the wind are obtained and studied to the simulated turbulence. At the same time, new analyzing tools, orthogonal wavelet techniques, are applied to provide additional information in time domain. This makes it possible to study the intermittency event, one important characteristic associated with pressure peak activities in turbulence. Three parameters, scale energy, intermittency factor and intermittency energy are defined. Variation of these quantities as a result of different configuration is discussed. Finally, the corresponding variations in measured pressure peaks in relation with the variations of configuration as well as with the intermittency parameters are investigated. The work here is of important significance for future wind tunnel and field data comparison, and this could help to find the best simulation among all configurations.