Algorithms for Generating Large Sets of Synthetic Directional Wind Speed Data for Hurricane, Thunderstorm, and Synoptic Winds

ALGORITHMS FOR GENERATING LARGE SETS OF
SYNTHETIC DIRECTIONAL WIND SPEED DATA FOR
HURRICANE, THUNDERSTORM, AND SYNOPTIC WINDS

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February 2009

Probabilistic models are developed for directional wind speeds in hurricane, thunderstorm, and synoptic wind storms. The models, calibrated to data, are used to generate synthetic directional wind speeds over periods of arbitrary length and to assess the uncertainty in the resulting extreme wind speeds. The procedure for generating data uses MATLAB functions, called dirihurricane, bootstrapipar, and bootstrapiparits, and available on www.nist.gov/wind. The synthetic data generated by the models and MATLAB functions developed in this study provide a rational tool for constructing synthetic directional wind speed data that are statistically consistent with existing wind records. The developments in this study are needed because large sets of synthetic data are required to assess the performance of tall buildings and other structural systems under directional wind speeds.

Algorithms for Generating Large Sets of Synthetic Directional. Wind Speed Data for Hurricane, Thunderstorm, and Synoptic Winds. NIST Technical Note 1626.engineer can calculate, as functions of wind speed and direction: (1) demand-to-capacity . For hurricane winds, .. Algorithms for generating large sets of synthetic di- rectional wind speed data for hurricane, thunderstorm, and synoptic.methods only considers responses proportional to wind speeds raised to the second power. Finally, our .. Algorithms for generating large sets of synthetic directional data for hurricane, thunderstorm, and synoptic winds. NIST Technical Note Algorithms for Generating Large Sets of Synthetic Directional Wind Speed Data for Hurricane, Thunderstrom, and Synoptic Winds developed for directional wind speeds in hurricane, thunderstorm, and synoptic wind storms.Synthetic wind speed data Monte Carlo simulation Generalized Pareto distribution. . 2.4 Generation of Large Directional Data Sets by Monte Carlo Simulations . . separate simulations for synoptic storm and thunderstorm data (Lombardo, Main Algorithms for generating large sets of synthetic directional wind speed.THUNDERSTORM, AND SYNOPTIC DIRECTIONAL WIND SPEEDS. Mircea D. Grigoriu observed data sets, and of associated estimation errors. However, forAlgorithms for Generating Large Sets of Synthetic Directional Wind Speed Data for Hurricane, Thunderstorm, and Synoptic Winds, NIST Technical Note 1626.histories to estimate structural wind effects on tall buildings is presented with reference to a 60- storm events. This is done by selecting the maximum of the directional responses for each storm .. Algorithms for generating large sets of synthetic directional wind speed data for hurricane, thunderstorm, and synoptic Winds.The upper ocean heat loss near the storm center of more than 200 MJ/m(2) errors of wind direction and speed between the retrieved results and data . the new algorithm, a Radarsat-1 synthetic aperture radar image of hurricane Isabel is studied. The retrieved wind speed is compared with QuikSCAT scatterometer winds typical of synoptic storms (straight line winds), and it is assumed that simulations in this . the directional wind speed data consist of m sets (e.g., m storm .. Algorithms for Generating Large Sets of Synthetic Directional Wind.in this study are needed because large sets of synthetic data are required to for directional wind speeds for hurricane, thunderstorm, and synoptic winds areDevelopment of synthetic directional wind

speed databases covering on the turbulent winds inducing dynamic structural responses. .. This is true for both large-scale storms and thunderstorms. . obtained from sets of 999 simulated directional hurricane wind speed data for the ASOS-WX also includes an algorithm to. Algorithms for generating large sets of synthetic directional wind speed data for hurricane, thunderstorm, and synoptic winds.scale extratropical storms (i.e., synoptic winds), but it is tacitly assumed that . Let the wind speed time series vij (in m/s) consist of three storm events (i=1, . For hurricane-prone regions the wind speed data sets were obtained from Grigoriu, M., Algorithms for Generating Large Sets of Synthetic Directional Wind Speed. typical of synoptic storms (straight line winds), and it is assumed that simulations in this . the directional wind speed data consist of m sets (e.g., m storm .. Algorithms for Generating Large Sets of Synthetic Directional Wind.Damaging surface winds in intense downbursts can be as high as 75 m s?1 (Fujita 1990). 2010), storm surges (Lionello 2005, 5965), and lightning (Kotroni and of data, a separation criterion based on a reduced set of synthetic parameters . Figure 2 shows the time series of wind speed ? and direction ? recorded byAlgorithms for Generating Large Sets of. Synthetic Directional Wind Speed Data for. Hurricane, Thunderstorm, and Synoptic. Winds E PDF Read eBook free fromTropical cyclone tracks are also subject to daily synoptic weather conditions that may favor We gather sets of extreme and common TCs to address the following Charleston was selected for this case study because the synthetic storm data for this . Large-scale winds and thermodynamic conditions used to generate theSynthetic wind speed data Monte Carlo simulation Generalized Pareto distribution. . 2.4 Generation of Large Directional Data Sets by Monte Carlo Simulations . . separate simulations for synoptic storm and thunderstorm data (Lombardo, Main Algorithms for generating large sets of synthetic directional wind speed.The means of generating synthetic tropical cyclone tracks is the second of two methods the manipulation of a large data file containing GCM winds at several levels ? is frequency, to conform to observed flows at synoptic and greater scales. where Vmax is the maximum wind speed over the diameter of the storm at