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Author Chun-Hung Chou
Author's Email Address No Public.
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Abstract
It is an important issue to master the characteristics of wind speed distribution exactly during estimating the wind energy. There are many factors, e.g., unreliable wind speed data、uncertain terrain and weather conditions near by the wind field, which effect the error of wind energy estimation. The paper utilizes Bins、Weibull and Gamma function to analyze the wind speed distribution of Tainan and Penghu, the shape & scale parameters of Weibull probability density function were evaluated by the method of the maximum likelihood and moments (expected value & standard deviation). The results show that there are significant differences between the characteristics of wind speed distribution in the Tainan and Penghu. The Weibull distribution is feasible for Tainan’s wind speed, and the Gamma distribution is better for Penghu’s wind speed in the summer & some specific months.
The modified formula for wind speed is proposed to solve iteratively the difference of two different wind fields. The complete historical wind data from weather station can be used to infer some important information about wind speed/generation surroundings where wind field may be established. Other parameters, like friction coefficients of environment, can also be assessed by the proposed wind speed formula. Some uncertainties obtained from the parameters during evaluation will be managed by a fuzzy number. The derived fuzzy wind speed accounts for the potential wind energy/generation near by the weather station with similar environment.
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