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Wind speed analysis in La Ventosa, Mexico: a bimodal probability distribution case

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Abstract

The statistical characteristics of the wind speed in La Ventosa, Oaxaca, Mexico, have been analyzed by using wind speed data recorded by Instituto de Investigaciones Eléctricas (IIE). By grouping the observations by annual, seasonal and wind direction, we show that the wind speed distribution, with calms included, is not represented by the typical two-parameter Weibull function. A mathematical formulation by using a bimodal Weibull&Weibull probability distribution function (PDF) has been developed to analyze the wind speed frequency distribution in that region. The model developed here can be applied for similar regions where the wind speed distribution presents a bimodal PDF.

The two-parameter Weibull wind speed distribution must not be generalised, since it is not accurate to represent some wind regimes as the case of La Ventosa, Mexico. The analysis of wind data shows that computing the capacity factor for wind power plants to be installed in La Ventosa must be carried out by means of a bimodal PDF instead of the typical Weibull PDF. Otherwise, the capacity factor will be underestimated.

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