عنوان مقاله:

Reliability-based Probabilistic Wind Power Planning Considering Correlation of Load and Wind

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خلاصه مقاله:

Wind power has been considered a future alternative to fossil energy resources. However, due to its stochastic nature, the integration of wind power plants (WPPs) into power systems poses some reliability problems such as a mismatch between load profile and efficient wind power generation. This issue can be alleviated by considering the correlation between hourly load and wind speed variations in the planning phase. To this end, a reliability-based wind power planning procedure is proposed and formulated as a stochastic programming problem. The objective function is the minimization of total costs, including capital investment, operating and maintenance, and customer energy not served costs. A new hybrid method that combines features of the load-duration curve and the K-means clustering algorithm is proposed to model the uncertainty of the input data. A shuffled frog-leaping algorithm is used to solve the proposed model. The simulation results indicate that the amount of adaptation between hours with high loads and those with high wind speeds markedly affects the selection of wind sites as optimal locations for WPP installation. Considering this issue can also improve power system reliability in the presence of WPPs.

کلمات کلیدی:

Power system reliability, Shuffled frog leaping algorithm, Uncertainty modeling, Wind power planning

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