Modeling of Daily Global Solar Radiation Using Ann Techniques: A Case of Study

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Abstract : In this study, many experiments were carried out to assess the influence of the input parameters on the performance of multilayer perceptron which is one the configuration of the artificial neural networks. To estimate the daily global solar radiation on the horizontal surface, we have developed some models by using seven combinations of twelve meteorological and geographical input parameters collected from a radiometric station installed at Ghardaïa city (southern of Algeria). For selecting of best combination which provides a good accuracy, six statistical formulas (or statistical indicators) have been evaluated, such as the root mean square errors, mean absolute errors, correlation coefficient, and determination coefficient. We noted that multilayer perceptron techniques have the best performance, except when the sunshine duration parameter is not included in the input variables. The maximum of determination coefficient and correlation coefficient are equal to 98.20 and 99.11%. On the other hand, some empirical models were developed to compare their performances with those of multilayer perceptron neural networks. Results obtained show that the neural networks techniques give the best performance compared to the empirical models.

Keywords : empirical models, multilayer perceptron neural network, solar radiation, statistical formulas

Conference Title : ICSEST 2017 : International Conference on Renewable Energy Sources and Technologies

Conference Location : Miami, United States

Conference Dates : March 09-10, 2017