

Modeling of Global Solar Radiation on a Horizontal Surface Using Artificial Neural Network: A Case Study

Authors : Laidi Maamar, Hanini Salah

Abstract : The present work investigates the potential of artificial neural network (ANN) model to predict the horizontal global solar radiation (HGSR). The ANN is developed and optimized using three years meteorological database from 2011 to 2013 available at the meteorological station of Blida (Blida 1 university, Algeria, Latitude 36.5°, Longitude 2.81° and 163 m above mean sea level). Optimal configuration of the ANN model has been determined by minimizing the Root Means Square Error (RMSE) and maximizing the correlation coefficient (R2) between observed and predicted data with the ANN model. To select the best ANN architecture, we have conducted several tests by using different combinations of parameters. A two-layer ANN model with six hidden neurons has been found as an optimal topology with (RMSE=4.036 W/m²) and (R²=0.999). A graphical user interface (GUI), was designed based on the best network structure and training algorithm, to enhance the users' friendliness application of the model.

Keywords : artificial neural network, global solar radiation, solar energy, prediction, Algeria

Conference Title : ICEERET 2016 : International Conference on Energy Efficiency and Renewable Energy Technologies

Conference Location : Barcelona, Spain

Conference Dates : February 15-16, 2016