SOLAR RESOURCE ESTIMATION USING ARTIFICIAL NEURAL NETWORKS AND COMPARISON WITH OTHER CORRELATION MODELS

K.S. Reddy and Manish Ranjan

Dept. of Mechanical Engineering, National Institute of Technology
(Formerly, Regional Engineering College)

Warangal- 506 004, Andhra Pradesh, India.

Abstract

Artificial Neural Network (ANN) based models for the estimation of monthly mean daily and hourly values of solar global radiation are presented in this paper. Solar radiation data from 13 stations spread over India around the year have been used for training and testing the ANN. The solar radiation data from 11 locations (6 from south India and 5 from north India) were used for training the Neural Networks and data from remaining 2 locations (one each from south India and north India) were used for testing the estimated values. The results of the ANN model have been compared with other empirical regression models. The solar radiation estimations by ANN are in good agreement with the actual values and are superior to that of other available models. Maximum mean absolute relative deviation of predicted hourly global radiation tested is 4.07%. The results indicate that the ANN model shows promise for evaluating solar global radiation possibilities at the places where monitoring stations are not established.

Keywords: Solar global radiation; Artificial neural networks; Multi-layer feed forward networks; Backpropagation; Mean absolute relative deviation; Percentage relative deviation.