

Improved Solar Radiation Model for Applications in Photovoltaics

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Abstract

The research work presents a comparison of selected isotropic and anisotropic solar radiation models used to predict the total solar radiation on any spatially oriented photovoltaic module plane, described by the elevation and azimuth angle, basing on the data for a horizontal orientation. A new correction factor for diffuse solar radiation was proposed improving the accuracy of calculations in comparison with climatology measured data received from the Institute of Meteorology and Water Management (52°25' N, 16°56' E) and own two – year measurements conducted using the laboratory station in the Faculty of Electrical Engineering at Poznan University of Technology. Statistical analysis is based on the percentage root - mean - square error (RMSE %) and mean - bias error (MBE%). The form of approximating function, as a new correction factor, was determined using simulations performed in MATLAB software. The results showed that the modified Liu – Jordan model with proposed correction factor can be successfully used to determine the solar radiation on a plane modified in two axes for analyzed location.

References

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