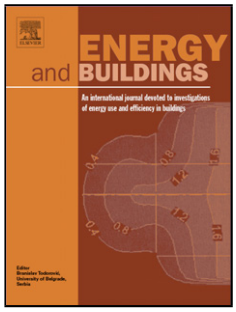

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Evaluation of Global Vertical Illuminance and Irradiance Models against Data from Yongin, South Korea

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Abstract

It is crucial to acknowledge the quantitative data on daylight illuminance and solar irradiance from a vertical plane or an incline plane for architects and architectural engineers in order to design energy efficient buildings and to create luminous environments. Also, the information of diffuse skies and the direct sun light from the vertical plane are essential in creating a comfortable working environment and a healthy indoor environment. This paper presents an evaluation of six inclined illuminance and irradiance models for Korea using two year of measured daylight weather data. In addition, a global vertical illuminance model for Korea was proposed. The evaluation was carried out for both global vertical illuminance and irradiance. The performance of all models was assessed with two common statistical parameters: the relative root mean square error (RMSE) and the relative mean bias error (MBE). As a result, all six models show high MBE and RMSE values and percentages for north-facing surfaces. On the other hand, predictions for south-facing surfaces produce good agreement with measured data. Kong's model shows the best prediction for global vertical illuminance as compared to those by Perez, Klucher, Hay, Temps–Coulson and Muneer. It is expected that the proposed model can be used as the basic data to maximize energy saving and to promote a pleasant building environment in Korea.

Key words: Daylight availability, Global vertical illuminance, Global vertical irradiance