

Horizontal and Vertical Illuminance Correlations in a Case Study for Shaded South Facing Surfaces

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Abstract : Daylight utilization is a key factor in achieving visual and thermal comfort, and energy savings in integrated building design. However, lack of measured data related to this topic has become a major challenge with the increasing need for integrating lighting concepts and simulations in the early stages of design procedures. The current paper deals with the values of daylight illuminance on horizontal and south facing vertical surfaces; the data are estimated using IESNA model and measured values of the horizontal and vertical illuminance, and a regression model with an acceptable linear correlation is obtained. The resultant illuminance frequency curves are useful for estimating daylight availability on south facing surfaces in Tehran. In addition, the relationship between indirect vertical illuminance and the corresponding global horizontal illuminance is analyzed. A simple parametric equation is proposed in order to predict the vertical illumination on a shaded south facing surface. The equation correlates the ratio between the vertical and horizontal illuminance to the solar altitude and is used with another relationship for prediction of the vertical illuminance. Both equations show good agreement, which allows for calculation of indirect vertical illuminance on a south facing surface at any time throughout the year.

Keywords : Tehran daylight availability, horizontal illuminance, vertical illuminance, diffuse illuminance

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