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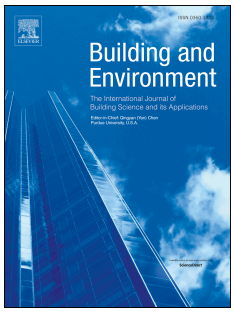

Universal Visible Sky Factor: A method for calculating the three-dimensional visible sky ratio

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PII: S0360-1323(17)30279-2

DOI: 10.1016/j.buildenv.2017.06.044

Reference: BAE 4972

To appear in: *Building and Environment*

Received Date: 3 March 2017

Revised Date: 24 June 2017

Accepted Date: 26 June 2017

Please cite this article as: Yi YK, Kim H, Universal Visible Sky Factor: A method for calculating the three-dimensional visible sky ratio, *Building and Environment* (2017), doi: 10.1016/j.buildenv.2017.06.044.

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Universal Visible Sky Factor: A Method for Calculating the Three-Dimensional Visible Sky Ratio

ABSTRACT

This paper developed a new methodology for evaluating the visible sky ratio of a vertical building surface. A visible sky ratio is based on a surface viewpoint and measured by projecting obstacles onto a virtual three-dimensional (3D) hemisphere. Typically, virtual sky projection methods use two-dimensional (2D) mapping to calculate the amount of view of the outside. A major concern with 2D mapping is loss of accuracy due to the distortions in geometry that occur during the projection process. To address this limitation, a new projection method has been developed, supported by a computational numeric model that calculates the actual projection area of obstacles onto a 3D hemisphere. The new method improves the accuracy of the visible sky ratio without distorting obstructions. This new method can handle more complex conditions such as the forms of surrounding buildings, as well as various layouts, orientations, and heights. This study examines the new method via existing calculation processes in order to determine its robustness and limitations. The proposed method compared positively to these other existing methods, especially in terms of vertical changes in the observation point.

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