

Analysis of Measurement Uncertainty in Experimental Methods Applied to Daylight in Buildings

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Lighting plays a critical role in ensuring both environmental comfort and energy efficiency in buildings, as it directly influences the creation of a suitable visual environment for performing visual tasks. The lighting of interior spaces can be achieved through natural light, artificial light, or preferably, whenever possible, a combination of both. Despite the existence of recent dynamic daylight metrics, the Daylight Factor (DF) still is a key metric for quantifying the daylighting conditions and is very useful in assessing the quality of the indoor luminous environment. Standardized guidelines for measuring indoor lighting conditions are provided by EN 12464-1, which addresses electric lighting, and EN 17037, which offers frameworks for daylighting in buildings, though its widespread use is still restricted for various real scenarios. While artificial lighting is commonly assessed based on these standards, daylighting conditions are less frequently measured, particularly due to challenges in accounting for external obstructions and for different sky nebosity conditions. This paper is focused on the impact of the illuminance (both outdoor and indoor) measurement uncertainty by comparing distinct experimental methods, namely, regarding its accuracy and how it can be improved, providing a comparative analysis that serves as a valuable tool for validating measurement approaches and supporting informed decision-making processes in architectural and lighting design.