All lighting designers appreciate the importance of maximising the benefits of daylight within an interior space. But accurately describing and representing daylight within a space remains challenging. Dr Jemima Unwin and Longyu Guan explore some of the latest, and changing, thinking around daylight metrics.
6). The indirect illuminance is the illuminance produced by the surfaces, and MRSE measures the average exitance in the space, the average indirect illuminance at each point can be averaged to give the ‘Average Indirect Illuminance of the space’ (Figure 7 below right) and from this, a value of ‘Average Indirect Illuminance of the space’ can be calculated. As MRSE, the Average Indirect Illuminance (AIE) of the space describes the overall inter-reflection within the room space. The more calculation points taken to calculate AIE, the closer the result will be to MRSE. However, AIE could be seen as an improvement because it overcomes the weakness of MRSE because it can be sub-sampled and can be calculated regardless of geometry complexities.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Describing daylight in space is challenging. However, as daylight is likely to influence wellbeing, it is an important area of study that requires further research. Whilst this article has shown that there is good theoretical justification for the use of volumetric daylight metrics, this does not constitute grounds for widespread adoption until there is more evidence to show that such metrics correlate better with the needs of building users compared to traditional metrics.

In conclusion, as a volumetric lighting metric for daylighting, Average Indirect Illuminance combines the advantages of both MRSE and cubic illuminance. It is one simple number which summarises the diffused daylight within the volume of space, yet it also can be sub-sampled and calculated anywhere in the space.

Unlike daylight factor, which only focuses on the working plane, Average Indirect Illuminance better represents daylight adequacy. In a study of three spaces it gave a higher value for a space that had a large window with a passive shading device, compared to daylight factor, and this was well correlated with office workers’ self-reported preferences.

The metric will also encourage high reflectance indoor surface materials. However, daylight metrics can only be reliably tested in a large number of real buildings. The link with people’s perception of daylight is challenging, as impressions are affected by other factors (such as view, weather and so on).

Further research will conduct more real-life case studies and compare the performance of different daylight metrics. The incorporation of climate-based daylight modelling into the method will also be explored.

REFERENCES


With thanks to Roderic Bunn, building performance analyst at the BSRIA, for kindly providing data for the pilot study.

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Figure 5. Example of direct and indirect illuminance (on a cube), assuming the window is on the distant left wall.

Figure 6. Example of direct and indirect illuminance (on a cube), assuming the window is on the distant left wall.

Figure 7. Indirect illuminance (left) and calculating average indirect illuminance of the space (above).