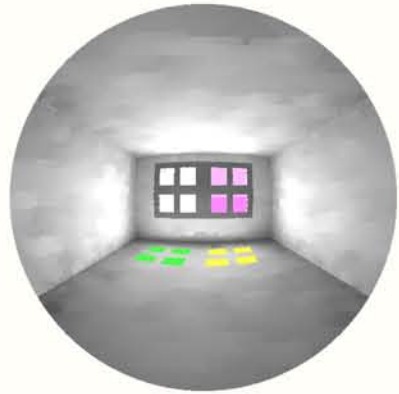


The Adaptation of Daylight Glare Probability to Dynamic Metrics in a Computational Setting



Daylight Glare Probability

Evalglare software by Jan Wienold

DGP = % occupants disturbed

pixel analysis of Radiance image

glare sources colored in output

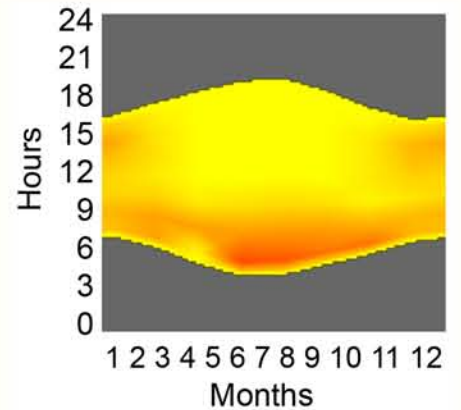
Temporal Graphic Data

X-axis = year, Y-axis = day

RED = % sensors > 40% DGP

224 simulations for each viewpoint

pixel analysis is not fast enough



Adapting DGP for annual simulations requires an approximation method...

There is a linear, vertical illuminance approximation for DGP (DGPs) which performs well for high luminance glare. But the model itself can be used to estimate the full DGP.

Model Information

The object file...

Geometry

Patch position

Patch normal

Materials

Reflectivity

Transmissivity

Tags for GLASS

and SENSOR

Can be used to find...

Possible glare source patches (glass)

Position Index of possible sources

Solid Angle of patches

Full DGP requires... A way to identify the glare sources, **POSITION INDEX**, **LUMINANCE**, and **SOLID ANGLE** of sources, and **VERTICAL ILLUMINANCE** at sensor.



Vertical Illuminance Simulation

Illuminance is calculated at vertical sensor patches.

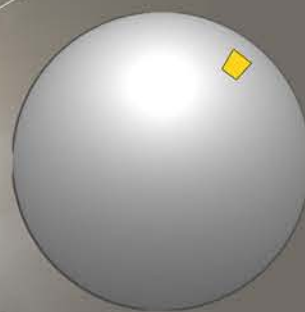
Annual illuminance simulation needs far less computation power than pixel analysis.

Source Luminance

The sky behind each glass patch is a potential glare source.

Sky luminance found using the equations for CIE clear, clear-turbid (polluted), and overcast skies and Matsuura intermediate sky.

Multiplied by window transmissivity, this is the luminance of the potential source.



Validation of DGP Approximation Method

Percent error from evalglare measured DGP

Model-based approximation error (pink) compared to DGPs error (blue)

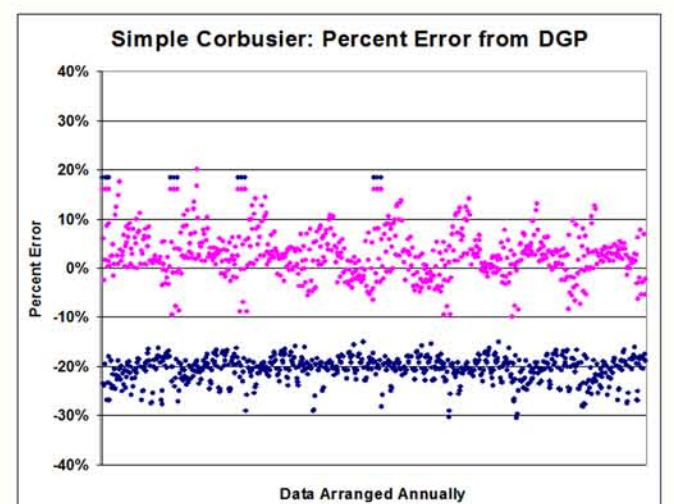
Four models: Classroom with vertical windows

Classroom with skylights

Room inspired by Corbusier (left/right)

Room with dark, heavy frame (above)

Model-based approximation outperforms DGPs



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