



Validated Interactive Daylighting Analysis for Architectural Design

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Can architects design for visual comfort?
Do interactive tools lead to better designs?

For architecture to benefit from daylight as a practical, glare-free alternative to electric lighting, designers need access to interactive simulation tools. This thesis describes the development of Accelerad, a GPU-accelerated ray-tracing tool that is validated against high dynamic range photography and annual simulations. Accelerad speeds up daylighting simulation 20 to 40 times without loss of accuracy. In human subject tests, its real-time feedback led to increased exploration of the design space, higher user confidence and satisfaction, and better performing designs with respect to daylight autonomy and daylight glare probability.