

Vertex-Based Formulations of Irradiance from Polygonal Sources

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Abstract

Irradiance at a point on a receiver due to a uniformly emitting polygon luminaire, or equivalently, the differential area to polygon form factor, is of fundamental interest in computer graphics. An elegant closed-form expression attributed to Lambert, dating from the 18th century, is the most commonly used formula for the problem. This document provides several alternatives to Lambert's formula, all of which are summations on the vertices of the source polygon rather than the edges. A term in a vertex-based summation is a function of the vertex position and the local behavior of the incident edges. The summations may be evaluated in any order and are therefore suited to algorithms where polygon contours are constructed incrementally.