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Global illumination is a model to generate photorealistic images in terms of the physically-based radiance propagation principle and also takes into account the direct illumination originated from light source as well as indirect illumination from other objects. There are two established rendering methods for global illumination: one is ray tracing method, tracing rays from the eye through the pixel grid back into the scene and computing indirection illumination with recursion; the other is radiosity method, accumulating the radiance transported between any two patches step by step until the steady state. In this thesis, we present a rendering method for spherical light source in a three-dimensional scene.
based on ray tracing and radiance propagation. We started with decomposing the light source surface into a set of triangles. Then it is needed to compute the totally effective radiance. During this effective radiance computation, a visibility determination process is involved. The goal of the visibility determination is to exclude some portions of light source triangles which can not light the intersection point. We use a rendering equation for computing direct illumination; as to indirect illumination, we also use recursive ray tracing to search influential objects. Then, four test scenes are applied to our method and we compare with different trace depths and various numbers of decomposed triangles on light source surface. Finally, we analyze and discuss our experimental results.

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