Title	3DAPI
Author(s)	,
Citation	
Issue Date	2008-03
Type	Thesis or Dissertation
Text version	author
URL	http://hdl.handle.net/10119/4288
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Description	Supervisor , ,

Abstract

Realistic rendering is one of the tendencies of research and development in graphics. In media such as movies or TV, realistic rendering has been enabled by results of study in this field. In realistic rendering, simulation of the light is important. Global Illumination is a field studying the simulation of light for Rendering.

Global Illumination can perform rendering of indirect lighting by the propagation of light between object surfaces. However, Global Illumination is unsuitable when interactive contents (such as in games) are necessary, because computational complexity is too great. Therefore, we render with rasterization of 3DAPI such as DirectX or OpenGL in interactive contents. On the other hand, many techniques of Global Illumination regard ray tracing as the basis. We encounter a problem to introduce Global Illumination into interactive contents, because the rendering techniques are different.

I realized Global Illumination rendering by 3DAPI in this article by using Photon Mapping which is one of the techniques of Global Illumination. Conventional Photon Mapping uses ray tracing for rendering, but builds a Photon Map, which stores illumination information as preprocessing in point group. Global Illumination was rendered in this study by applying Photon Map to the object surface by 3DAPI. In addition, I realized rendering of Caustics and Participating Media made using Photon Mapping by applying rasterization technique, and enabled rendering usually in real time of Global Illumination by adding optimization.