Arc::Torus Code Paper and Demonstration

Arc::Torus used to simulate the PDT process and predict treatment efficacy.

Freddy Wordingham

Abstract

This is the abstract text.

Contents

Symbols

n	Number density
t	Time
$\vec{r}$	Position
d_i	ith Length Dimension ($d_0 = x$)
D	Diffusion coefficent
∂	Partial derivative
∇	Vector differential operator del

1 Domain

1.1 Input

A single input manifest specifying the geometry of the surfaces and their respective materials.

2 Monte Carlo Radiative Transfer

3 Diffusion

The diffusion equation is a partial differential equation used to describe the behaviour of a collection of a statistically large number of species whose collective motion of the species results from the random movement of each particle arising from brownian motion.

The standard form of the diffusion equation is written as:

$$\frac{\partial n(\vec{r},t)}{\partial t} = \nabla \cdot (D(n,\vec{r})\nabla n(\vec{r},t)) \quad (1)$$

When the diffusion coefficient is anisotropic, the diffusion coefficient is represented as a symmetric positive definite matrix, and the diffusion rate at a given position in time is written as:

$$\frac{\partial n(\vec{r},t)}{\partial t} = \sum_{i=0}^{2}\sum_{j=0}^{2}\sum_{k=0}^{2}\frac{\partial}{\partial x_i d_i}(D_{i,j,k}(n,\vec{r})) \quad (2)$$

4 Chemical Reactions