Radiosity: the physics of image formation, radiance, irradiance, brightness , color

Radiosity is a technique in computer graphics that models the way light is reflected and diffused between surfaces in a scene. It is a global illumination algorithm, which means that it takes into account the light that is reflected from all surfaces in the scene, not just the light that comes directly from the light sources. This makes radiosity more realistic than other rendering techniques, such as ray tracing, which only considers the direct light paths.

The physics of image formation is the study of how light interacts with objects and surfaces to create an image. It is a complex topic, but some of the key concepts include:

* Radiance: The radiant power per unit area, per unit solid angle, per unit wavelength. Radiance is a measure of the amount of light that is emitted from a surface in a particular direction.
* Irradiance: The radiant flux per unit area. Irradiance is a measure of the amount of light that is incident on a surface.
* Brightness: The perceived intensity of light. Brightness is a subjective measure, and it can be affected by factors such as the size of the light source, the distance to the light source, and the reflectance of the surface.
* Color: The perception of different wavelengths of light. Color is also a subjective measure, and it can be affected by factors such as the brightness of the light, the surrounding colors, and the individual's perception of color.

Radiosity is used to calculate the brightness and color of surfaces in a scene by taking into account the radiance and irradiance of all the surfaces in the scene. This is done by solving the radiosity equation, which is a complex mathematical equation that models the way light is reflected and diffused between surfaces.

Radiosity is a powerful technique for creating realistic images, but it can be computationally expensive. This is because it requires solving the radiosity equation for every surface in the scene. However, advances in computer hardware and software have made radiosity more affordable and accessible. As a result, radiosity is becoming increasingly popular in computer graphics applications, such as architectural visualization, product design, and video games.