What does Hooke's Law describe?

Simulations

Who is Hooke's Law named after?

Simulations

For lighting models,

What does **BDF** stand for.

Simulations

A BDRF is formulated as:

$$f_r(\omega_i, \omega_r)$$

Describe the parameters and output value.

Simulations

A **physically based** BRDF has these 3 properties:

$$f_r(\omega_i, \omega_r) \geq 0$$

$$f_r(\omega_i, \omega_r) = f_r(\omega_r, \omega_i)$$

$$\forall \omega_i, \int_\Omega f_r(\omega_i, \omega_r) \cos\theta_r d\omega_r \leq 1$$

What do they mean?

Simulations

For lighting models,

What does **BRDF** stand for.

Simulations

For lighting models,

What does **BSDF** stand for.

Simulations

For lighting models,

What does **BSSTDF** stand for.

Simulations

For lighting models,

what are the two categories of materials that define a material's metalness?

Simulations

For lighting models,

What does **BTDF** stand for.

Simulations

Robert Hook
(1635 - 1703)

AKA: Isaac Newton's arch-nemesis!

The mathematical behaviour of **spring systems**?

ω_i is the incomming light direction..
ω_r is the outgoing light direction.

The output if the amount of light reflected.
(This will be a value between [0, 1].)

Bidirectional
Distribution
Function

A combination of the BRDF and BTDF.

Bidirectional
Reflectance
Distribution
Function

- There's no such thing as negative light.
- Helmholtz reciprocity.
(Reflections are reversible.)
- Convervation of energy.

Bidirectional
Scattering-
Surface
Transmittance
Distribution
Function

Similar to the BTDF but with subsurface scattering.

Bidirectional
Scattering
Distribution
Function

A superset and generalization
of both the BRDF and BTDF.

Bidirectional
Transmittance
Distribution
Function

Conductors
AND
Dielectrics

AKA: Metals vs Insulators.
(Semiconductors are usually ignored)

For lighting models,

what does microfacet theory describe?

Simulations

For lighting models,

What does **SVBRDF** stand for.

Simulations

For lighting models,

What does the term **Transmission** refer to?

Simulations

What is the name of the equations that deeply model:

- Classical electromanetism
- Classical optics
- Electrical circuts

?

Simulations

What does the Navier-Stokes formula describe?

Simulations

What formula models the behaviour of fluids, in-depth?

Simulations

What is the **difference** in focus between the sciences of **Radiometry** vs **Photometry**

Simulations

What is the IOR of **air**?

IOR: Index of Refraction

Simulations

What is the **IOR** of diamond?

IOR: Index of Refraction

Simulations

The formula for calculating the index of refraction for a material is:

$$n = \frac{c}{v}$$

Name all the variables.

Simulations

Spatially
Varying
Bidirectional
Reflectance
Distribution
Function

ANSWER

How microscopic texture qualities of a material affect how it looks at human scale.

ANSWER

The Maxwell Equations

ANSWER

When light travels through a medium.

Such as light passing through glass.

ANSWER

Navier-Stokes equation.

ANSWER

It mathematically models, in-depth, the behaviour of fluids.

ANSWER

1.000277 at STP
(Credit for "very slightly over 1.0")

STP: Standard temp & pressure

ANSWER

Radiometry is an **objective** science,
Photometry is more focused on human **perception**.

ANSWER

n = Index of Refraction
c = Speed of Light in vacuum
v = Medium's Phase Velocity

Where c is 299,792,458 m/s
Where v the speed of light in the medium.

ANSWER

2.417

ANSWER

What is the **IOR** of fused silica?
(it's a form of pure glass)

IOR: Index of Refraction

Simulations

What is the **IOR** of pyrex?
(a borosilicate glass)

IOR: Index of Refraction

Simulations

What is the **IOR** of fused silica?
(it's a form of pure glass)

IOR: Index of Refraction

Simulations

What is the IOR of a **vaccum**?

IOR: Index of Refraction

Simulations

What is the **IOR** of **water** at ~20°c?

IOR: Index of Refraction

Simulations

Describe **Total Internal Reflection.**

AKA: TIR

Simulations

What is it called when a light path experiences an angle of **refraction** that **bounces** it **back** into the **same** medium?

Simulations

What does **Snell's Law** describe?

Simulations

What formula models how **light** will **bend** as it transmits from one medium to another.

Simulations

What is a **solid angle**?

Simulations

1.470

1.458

1.0

1.458

When a light path experiences a high angle of refraction that bends the path back into the original medium.

1.333

How a path of light will bend as it transmits from one medium into another.

Total Internal Reflection

AKA: TIR

A cone, similar to a 2D angle, but representing an angle in 3D space.

Snell's Law

What is an **einstein** unit?

Simulations

What is the name of the **physics law** that describes the **attenuation** of **light** through a medium?

Simulations

What does the **Beer-Lambert Law** describe?

Simulations

What does **Cauchy's equation** describe?

Simulations

What is the name for a discrete **packet** of **electromagnetic energy**?

Simulations

What is it called when many discrete **photons** that are passing through a surface are treated as a **continuous** quantity?

Simulations

What do the **Fresnel equations** describe?

Simulations

What is the name of the observation of how **light paths** are **reversible**?

Simulations

What is the name of the **physics law** that describes the behaviour of **springs**?

Simulations

Beer-Lambert Law

A quantity of 6.022×10^{23} photons

Also known a "photon mole".

An approximation for how the wavelength of light changes when passing through mediums with different IORs.

How light is absorbed & attenuated as it transmits though a medium.

Flux

Photon

Helmholtz Reciprocity

How **reflective** a **surface** material is based on the **angle** light hits it.

Hooke's Law