

Physical Rendering

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Contents

1	Measurements	2
1.1	Radiant Flux	2
1.2	Irradiance	2
1.3	Radiance	2
2	Terminology	2
3	Rendering equation	3

1 Measurements

1.1 Radiant Flux

The radiant flux (or power) Φ is the total amount of energy passing through a surface per second and is measured in $[W]$ (watts) as $\frac{J}{s}$.

1.2 Irradiance

The irradiance E is the measurements of the radiant flux per *unit area* and is measured in $[W][M]^{-2}$ as $\frac{\Phi}{m^2}$.

1.3 Radiance

The radiance L is the irradiance per unit solid angle (steradian) and is measured in $[W][M]^{-2}[M]^{-2}[sr]^{-1}$ as $\frac{E}{sr}$.

2 Terminology

- \hat{V} direction towards the camera
- \hat{N} surface normal
- \hat{L} vector pointing toward the light source
- \hat{R} reflected ray direction
- $\theta_i \theta_r$ incident and reflected angles

$$\hat{R} = \hat{L} - 2\hat{N}(\hat{L} \cdot \hat{N})$$

3 Rendering equation

The rendering equation tells us how much light is exiting a *surface point* in a given direction