| | |
|---|---|
| R | red channel of point light diffuse color |
| G | green channel of point light diffuse color |
| B | blue channel of point light diffuse color |
| Di | point light diffuse intensity |
| Ai | point light ambient intensity |
| C | point light constant attenuation |
| L | point light linear attenuation |
| Q | point light quadratic attenuation |
| m | point light cuttof point (value at which a color is so close to zero its considered insignificant)<br>this value may be set to $\frac{1}{256} = 0.00390625$ as a constant for every point light |
| | |
| r | point light's bounding sphere radius |

$f = \max(\, Di, Ai \,) * \max(\, R, G, B \,)$

$if\ L \neq 0\ and\ Q \neq 0\ then$

$$\frac{f}{C + L * d + Q * d^2} = m$$
$$Q * d^2 + L * d + \left(c - \frac{f}{m}\right) = 0$$
$$d_{1,2} = \frac{-L \pm \sqrt{L^2 - 4 * Q * \left(C - \frac{f}{m}\right)}}{2 * Q}$$
$$r = \max(d_1, d_2)$$

$if\ L = 0\ and\ Q \neq 0\ then$

$$\frac{f}{C + Q * d^2} = m$$
$$Q * d^2 + \left(c - \frac{f}{m}\right) = 0$$
$$r = d = \sqrt{\frac{-\left(c - \frac{f}{m}\right)}{Q}}$$

$if\ L \neq 0\ and\ Q = 0\ then$

$$\frac{f}{C + L * d} = m$$
$$C + L * d = \frac{f}{m}$$
$$r = d = \frac{\frac{f}{m} - C}{L}$$

$if\ L = 0\ and\ Q = 0\ then$

$$r = d = \infty$$