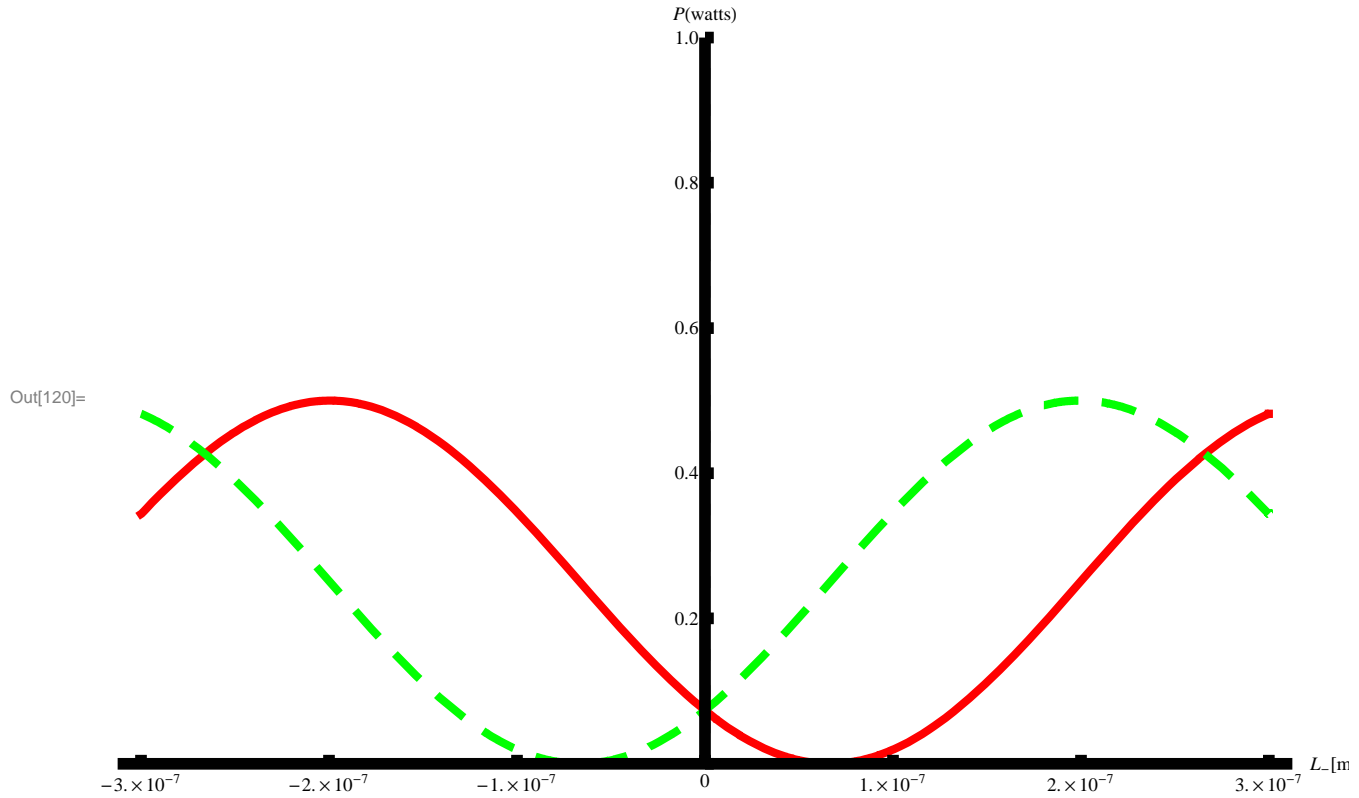


```

In[120]:= Plot[ $\left\{ \frac{1}{8} \left( e^{i(2\pi/1064 \times 10^{-9})L} - e^{\frac{i\pi}{4} - i(2\pi/1064 \times 10^{-9})L} \right) \left( e^{-i(2\pi/1064 \times 10^{-9})L} - e^{-\frac{i\pi}{4} + i(2\pi/1064 \times 10^{-9})L} \right), \right.$ 
 $\left. \frac{1}{8} \left( e^{-\frac{i\pi}{4} - i(2\pi/1064 \times 10^{-9})L} - e^{i(2\pi/1064 \times 10^{-9})L} \right) \left( e^{\frac{i\pi}{4} + i(2\pi/1064 \times 10^{-9})L} - e^{-i(2\pi/1064 \times 10^{-9})L} \right) \right\},$ 
{L, -3*10^-7, 3*10^-7}, PlotRange -> {0, 1},
PlotStyle -> {{RGBColor[1, 0, 0], Thickness[0.007]},
{RGBColor[0, 1, 0], Thickness[0.007], Dashing[{0.03, 0.02]}}},
AxesOrigin -> {0, 0}, AxesLabel -> {L. [meters], P [watts]},
AxesStyle -> Thickness[0.01]}
(* OUTPUT POWER ::: Red is p-port, Green is s-port ::: P=E*E
PPP =  $\left(\frac{P_{in}}{8}\right) \left(e^{i*k*L} - e^{i(-k*L + \frac{\pi}{4})}\right) \left(e^{-i*k*L} - e^{i(k*L - \frac{\pi}{4})}\right)$  PSP =  $\left(\frac{P_{in}}{8}\right) \left(e^{i(-k*L - \frac{\pi}{4})} - e^{i*k*L}\right) \left(e^{i(k*L + \frac{\pi}{4})} - e^{-i*k*L}\right)$  *)

```



```
In[119]:= Plot[{\sqrt{\left(2 * \left(\frac{1}{8} \left(e^{i(2\pi/1064*10^{-9})L} - e^{\frac{i\pi}{4}-i(2\pi/1064*10^{-9})L}\right) \left(e^{-i(2\pi/1064*10^{-9})L} - e^{-\frac{i\pi}{4}+i(2\pi/1064*10^{-9})L}\right)\right) * \left(6.626*10^{-34}\right) * \left(\frac{2.998*10^8}{1064*10^{-9}}\right)\right)},
```

```
\sqrt{\left(2 * \left(\frac{1}{8} \left(e^{-\frac{i\pi}{4}-i(2\pi/1064*10^{-9})L} - e^{i(2\pi/1064*10^{-9})L}\right) \left(e^{\frac{i\pi}{4}+i(2\pi/1064*10^{-9})L} - e^{-i(2\pi/1064*10^{-9})L}\right)\right) * \left(6.626*10^{-34}\right) * \left(\frac{2.998*10^8}{1064*10^{-9}}\right)\right)}, {L, -3*10^{-7}, 3*10^{-7}}, PlotRange -> {0, 5*10^{-10}},
```

```
PlotStyle -> {{RGBColor[1, 0, 0], Thickness[0.007]}, {RGBColor[0, 1, 0], Thickness[0.007], Dashing[{0.03, 0.02]}}},
```

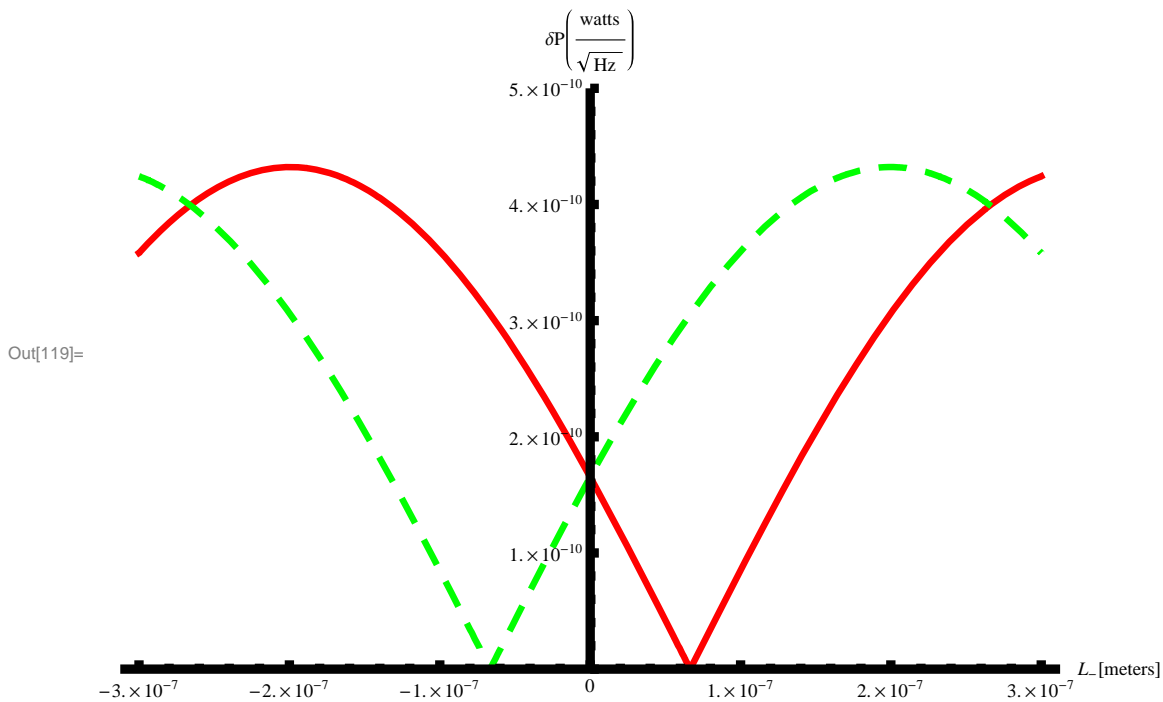
```
AxesOrigin -> {0, 0}, AxesLabel -> {L. [meters], \delta P \left[\frac{\text{watts}}{\sqrt{\text{Hz}}}\right]},
```

```
AxesStyle -> Thickness[0.01]
```

```
(* NSD (POWER) ::: Red is p-port, Green is s-port ::: \delta P = \sqrt{2*P*h*f}
```

$$\delta P_{PP} = \sqrt{\left(\frac{P_{in}}{4}\right) \left(e^{i*k*L} - e^{i(-k*L + \frac{\pi}{4})}\right) \left(e^{-i*k*L} - e^{i(k*L - \frac{\pi}{4})}\right) * h * \frac{c}{\lambda}}$$

$$\delta P_{SP} = \sqrt{\left(\frac{P_{in}}{4}\right) \left(e^{i(-k*L - \frac{\pi}{4})} - e^{i*k*L}\right) \left(e^{i(k*L + \frac{\pi}{4})} - e^{-i*k*L}\right) * h * \frac{c}{\lambda} *}$$



```

In[118]:= Plot[{{
  
$$\left(\frac{I * (2 * \text{Pi} / 1064 * \wedge{-9})}{8}\right)$$

  
$$\left(\left(e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} - e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L + \frac{i \pi}{4}}\right) \left(-e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} - e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L - \frac{i \pi}{4}}\right) + \right.$$

  
$$\left.\left(e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} - e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L - \frac{i \pi}{4}}\right) \left(e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} + e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L + \frac{i \pi}{4}}\right)\right),$$

  
$$\left(\frac{I * (2 * \text{Pi} / 1064 * \wedge{-9})}{8}\right) \left(\left(-e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} + e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L + \frac{i \pi}{4}}\right)\right.$$

  
$$\left.\left(-e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} - e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L - \frac{i \pi}{4}}\right) + \right.$$

  
$$\left.\left(-e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} + e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L - \frac{i \pi}{4}}\right) \left(-e^{-i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L} + e^{i * (2 * \text{Pi} / 1064 * \wedge{-9}) * L + \frac{i \pi}{4}}\right)\right)\}},$$

  {L, -3*^-7, 3*^-7}, PlotRange -> {-3*^6, 3*^6},
  PlotStyle -> {{RGBColor[1, 0, 0], Thickness[0.007]},
  {RGBColor[0, 0.5, 0], Thickness[0.007], Dashing[{0.03, 0.02]}}},
  AxesOrigin -> {0, 0}, AxesLabel -> {L_ [meters],  $\frac{dP}{dL_}$  [ $\frac{\text{watts}}{\text{meters}}$ ]},
  AxesStyle -> Thickness[0.01]}

```

(\* OPTICAL GAIN :: Red is p-port, Green is s-port :: =  $\frac{dP}{dL_}$

$$\left(\frac{dP}{dL_}\right)_{PP} = \left(\frac{P_{in} * i * k}{8}\right) \left(\left(e^{i * k * L_} - e^{i(k * L_ + \frac{\pi}{4})}\right) \left(-e^{-i * k * L_} - e^{i(k * L_ - \frac{\pi}{4})}\right) + \left(e^{-i * k * L_} - e^{i(k * L_ - \frac{\pi}{4})}\right) \left(e^{i * k * L_} + e^{-i(k * L_ + \frac{\pi}{4})}\right)\right)$$

$$\left(\frac{dP}{dL_}\right)_{SP} = \left(\frac{P_{in} * i * k}{8}\right) \left(\left(e^{i(k * L_ + \frac{\pi}{4})} - e^{-i * k * L_}\right) \left(-e^{i(k * L_ - \frac{\pi}{4})} - e^{i * k * L_}\right) + \left(e^{-i(k * L_ + \frac{\pi}{4})} - e^{i * k * L_}\right) \left(e^{i(k * L_ + \frac{\pi}{4})} + e^{-i * k * L_}\right)\right) *$$

