In[1]:=
```
Iin[t_] = A Cos[fz * t] + B Cos[fo * t];
```

In[2]:=
```
Il[t_] = Cs Sin[fz * t - fo * t] + Cc Cos[fz * t - fo * t];
```

In[3]:=
```
Uu[t_] = (L0 + a (Iin[t] - Il[t])) (Iin'[t] - Il'[t]) // TrigReduce
```

Out[3]=
$$\frac{1}{2} a A Cs\, fo \cos[fo\, t] - \frac{1}{2} a B Cs\, fz \cos[fz\, t] + \frac{1}{2} a A Cs\, fo \cos[fo\, t - 2\, fz\, t] - a A Cs\, fz \cos[fo\, t - 2\, fz\, t] - a Cc Cs\, fo \cos[2\, fo\, t - 2\, fz\, t] + a Cc Cs\, fz \cos[2\, fo\, t - 2\, fz\, t] + Cs\, fo\, L0 \cos[fo\, t - fz\, t] - Cs\, fz\, L0 \cos[fo\, t - fz\, t] + a B Cs\, fo \cos[2\, fo\, t - fz\, t] - \frac{1}{2} a B Cs\, fz \cos[2\, fo\, t - fz\, t] + \frac{1}{2} a A Cc\, fo \sin[fo\, t] - B\, fo\, L0 \sin[fo\, t] - \frac{1}{2} a B^2\, fo \sin[2\, fo\, t] + \frac{1}{2} a B Cc\, fz \sin[fz\, t] - A\, fz\, L0 \sin[fz\, t] - \frac{1}{2} a A^2\, fz \sin[2\, fz\, t] + \frac{1}{2} a A Cc\, fo \sin[fo\, t - 2\, fz\, t] - a A Cc\, fz \sin[fo\, t - 2\, fz\, t] - \frac{1}{2} a Cc^2\, fo \sin[2\, fo\, t - 2\, fz\, t] + \frac{1}{2} a Cs^2\, fo \sin[2\, fo\, t - 2\, fz\, t] + \frac{1}{2} a Cc^2\, fz \sin[2\, fo\, t - 2\, fz\, t] - \frac{1}{2} a Cs^2\, fz \sin[2\, fo\, t - 2\, fz\, t] - \frac{1}{2} a A B\, fo \sin[fo\, t - fz\, t] + \frac{1}{2} a A B\, fz \sin[fo\, t - fz\, t] + Cc\, fo\, L0 \sin[fo\, t - fz\, t] - Cc\, fz\, L0 \sin[fo\, t - fz\, t] + a B Cc\, fo \sin[2\, fo\, t - fz\, t] - \frac{1}{2} a B Cc\, fz \sin[2\, fo\, t - fz\, t] - \frac{1}{2} a A B\, fo \sin[fo\, t + fz\, t] - \frac{1}{2} a A B\, fz \sin[fo\, t + fz\, t]$$

In[4]:=
```
Coefficient[Uu[t] // TrigReduce, Cos[fz t]]
x = (Coefficient[Uu[t] // TrigReduce, Sin[fo * t - fz * t ]] -
   Coefficient[Uu[t] // TrigReduce, Sin[-fo * t + fz * t ]])
y = (Coefficient[Uu[t] // TrigReduce, Cos[fo * t - fz * t ]] +
   Coefficient[Uu[t] // TrigReduce, Cos[-fo * t + fz * t ]])
```

Out[4]=
$$-\frac{1}{2} a B Cs\, fz$$

Out[5]=
$$-\frac{1}{2} a A B\, fo + \frac{1}{2} a A B\, fz + Cc\, fo\, L0 - 2\, Cc\, fz\, L0$$

Out[6]=
$$2\, Cs\, fo\, L0 - 2\, Cs\, fz\, L0$$

In[7]:=
```
Cs[fz_, fo_, A_, B_, r_, L0_, a_] = Cs /. Solve[{r Cs == x, r Cc == y}, {Cs, Cc}][[1]]
Cc[fz_, fo_, A_, B_, r_, L0_, a_] = Cc /. Solve[{r Cs == x, r Cc == y}, {Cs, Cc}][[1]]
```

Out[7]=
$$-\frac{(a A B\, fo - a A B\, fz)\, r}{2\left(-2\, fo^2\, L0^2 + 6\, fo\, fz\, L0^2 - 4\, fz^2\, L0^2 + r^2\right)}$$

Out[8]=
$$\frac{a A B\, (fo - fz)^2\, L0}{2\, fo^2\, L0^2 - 6\, fo\, fz\, L0^2 + 4\, fz^2\, L0^2 - r^2}$$

In[9]:=
```
Puit[fz_, fo_, A_, B_, r_, L0_, a_] =
  r / 2 (Cs[fz, fo, A, B, r, L0, a]^2 + Cc[fz, fo, A, B, r, L0, a]^2) // FullSimplify;
```

In[10]:=
```
Pin[fz_, fo_, A_, B_, r_, L0_, a_] = 0.5 ( a B A Cs[fz, fo, A, B, r, L0, a] fz) // FullSimplify
```

Out[10]=
$$-\frac{0.25\, a^2 A^2 B^2\, (fo - fz)\, fz\, r}{-2\, (fo - 2\, fz)\, (fo - fz)\, L0^2 + r^2}$$

In[11]:=
```
rend[fz_, fo_, A_, B_, r_, L0_, a_] =
 Puit[fz, fo, A, B, r, L0, a] / Pin[fz, fo, A, B, r, L0, a] // FullSimplify
```

Out[11]=
$$-\frac{0.5\,(\text{fo}-\text{fz})\left(4\,(\text{fo}-\text{fz})^2\,\text{L0}^2+\text{r}^2\right)}{\text{fz}\left(-2\,(\text{fo}-2\,\text{fz})\,(\text{fo}-\text{fz})\,\text{L0}^2+\text{r}^2\right)}$$

In[12]:=
```
rend[fz, fo, A, B, r, L0, a]
```

Out[12]=
$$-\frac{0.5\,(\text{fo}-\text{fz})\left(4\,(\text{fo}-\text{fz})^2\,\text{L0}^2+\text{r}^2\right)}{\text{fz}\left(-2\,(\text{fo}-2\,\text{fz})\,(\text{fo}-\text{fz})\,\text{L0}^2+\text{r}^2\right)}$$

In[13]:=
```
Plot[{Abs[rend[x, 10, 1, 1, 1, 1, 0.1]], 20 Abs[rend[x, 10, 1, 0.1, 1, 0, 0.1]]},
 {x, 0, 20}, PlotRange → {0, 20}]
```

Out[13]=