In[1]:=
```
Solve[{0 == -kf * L * Rs + kr * Rst - ke * Rs + Vs, 0 == kf * L * Rs - kr * Rst - kest * Rst,
    L == (q * nc + kr * Rst * nc)/(km + kf * Rs * nc)}, {Rst, Rs, L}] // FullSimplify
```

Out[1]=
$$\left\{\left\{\text{Rst} \to \frac{1}{2\,\text{kest}^2\,\text{kf}\,\text{nc}}\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}+\text{Vs}\right)+\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right),\right.\right.$$
$$\text{Rs} \to -\frac{1}{2\,\text{ke kest kf nc}}\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)+\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right),$$
$$\left.\text{L} \to -\frac{1}{2\,\text{kest kf km}}\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(-\text{q}+\text{Vs}\right)+\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right)\right\},$$
$$\left\{\text{Rst} \to \frac{1}{2\,\text{kest}^2\,\text{kf}\,\text{nc}}\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}+\text{Vs}\right)-\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right),\right.$$
$$\text{Rs} \to \frac{1}{2\,\text{ke kest kf nc}}\left(-\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(-\text{q}+\text{Vs}\right)+\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right),$$
$$\left.\left.\text{L} \to \frac{1}{2\,\text{kest kf km}}\left(-\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)+\sqrt{\left(\left(\text{ke km}\left(\text{kest}+\text{kr}\right)+\text{kest kf nc}\left(\text{q}-\text{Vs}\right)\right)^2+4\,\text{ke kest kf km}\left(\text{kest}+\text{kr}\right)\text{nc Vs}\right)}\right)\right\}\right\}$$

In[2]:=
```
ke = 10^-4;
kest = 5 * 10^-3;
kf = 5.14 * 10^-21;
kr = 2.5 * 10^-2;
kdeg = 8 * 10^-4;
Vs = 18;
q = 10^3;
nc = 3 * 10^8;
γ = 10^2;
DL = 10^-10;
km = DL/z (γ * z^2/DL)^(1/3);
```

In[13]:=
```
L = 1/(2 kest kf km) (-ke km (kest + kr) + kest kf nc (q - Vs) +
    Sqrt((ke km (kest + kr) + kest kf nc (q - Vs))^2 + 4 ke kest kf km (kest + kr) nc Vs));
```

In[14]:=
```
Kss = (kest * kf)/(ke (kr + kest));
```

In[15]:=
```
Rstt = (1/kest + 1/kdeg) * Kss * Vs * L // FullSimplify
```

Out[15]=
$$-13\,050. + \frac{1}{\left(z^2\right)^{1/3}} z \left(32\,934.8 + 4.35 \times 10^{15} \sqrt{5.73234 \times 10^{-23} + \frac{4.70927 \times 10^{-23}\, z}{\left(z^2\right)^{2/3}} + \frac{9. \times 10^{-24}}{\left(z^2\right)^{1/3}}}\right)$$

The mitotic activity will follow the above profile and would be scaled by the proportionality constant, mitogenic signal(γ) which arises from transport and signal transduction: mitotic activity=$\gamma^* R^*_{\text{total}}$

In[17]:=
```
Plot[Rstt, {z, 0, .0001}, AxesLabel -> Automatic, PlotRange → All,
 PlotLabel → "Mitotic Activity Profile as a Function of z"]
```

Out[17]=