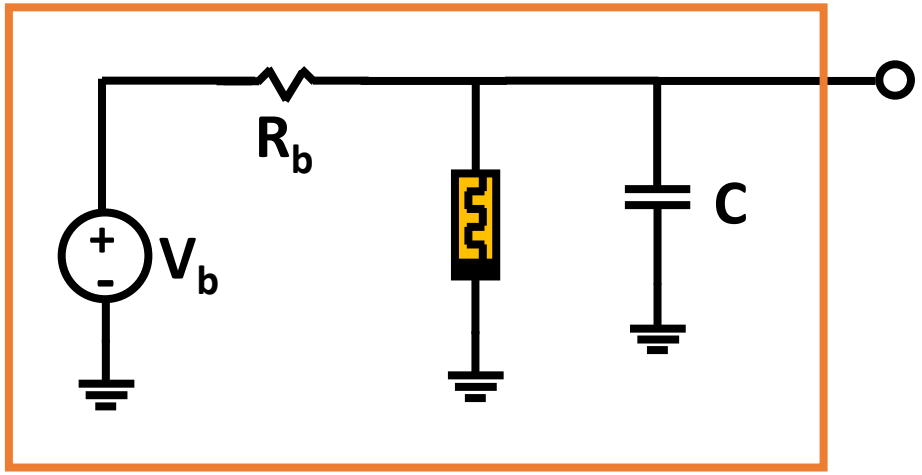
SINGLE CELL



Equations

$$C\frac{dV_c}{dt} = \frac{V_b - V_c}{R_b} - G(T)\cdot V_c$$

$$C_{th}\frac{dT}{dt} = {V_c}^2 \cdot G(T) - (T - T_0)\cdot g_{th}$$

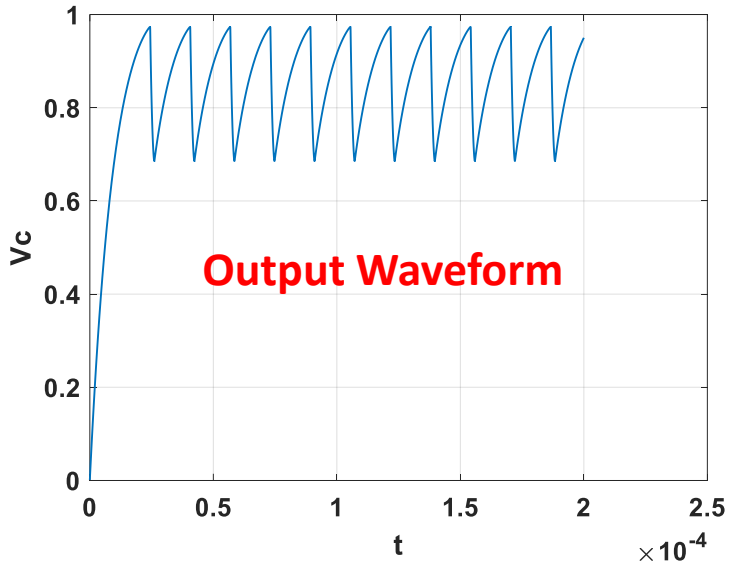
$$G(T) = g_0 \exp(-g_1/T)$$

Parameters

```
g0=5e-3; g1=1700;
Cth=1e-14; gth=1/1.5e6; T0=300;
Vb=1.1; Rb=1e3; C=10e-9;
```

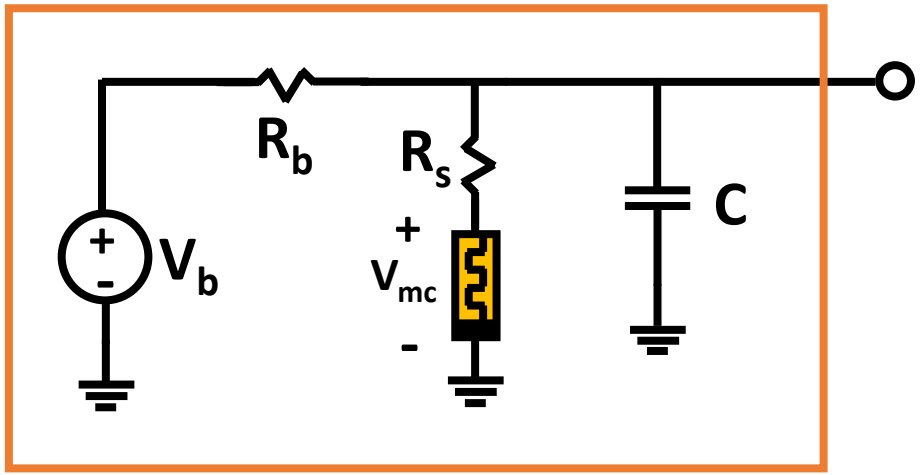
Initial conditions

```
T_init = 300; Vc_init = 0.001;
```



Solve the equations Matlab/Python
Try to obtain the same output waveform!

SINGLE CELL with Rs



Equations

$$C\frac{dV_c}{dt} = \frac{V_b - V_c}{R_b} - G(T)\cdot V_m$$

$$C_{th}\frac{dT}{dt} = {V_{mc}}^2 \cdot G(T) - (T - T_0)\cdot g_{th}$$

$$G(T) = g_0 \exp(-g_1/T)$$

$$V_{mc} = \frac{V_c}{1 + G(T)\cdot Rs}$$

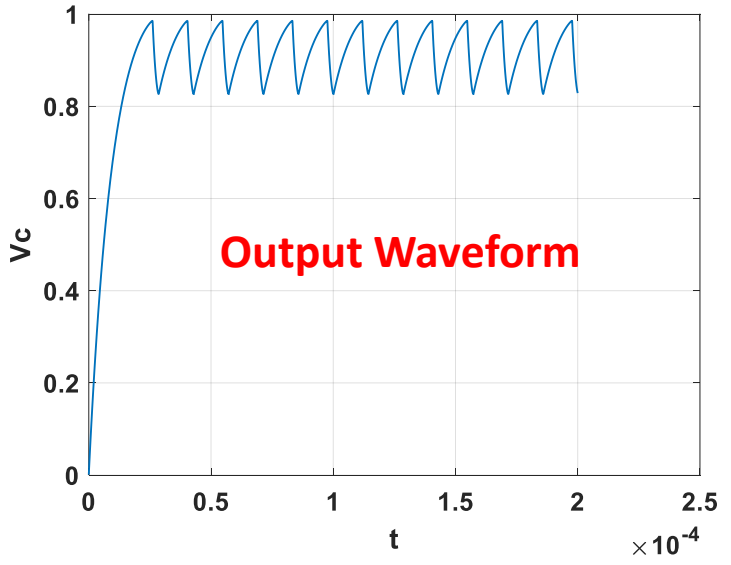
Parameters

```
g0=5e-3; g1=1700;
Cth=1e-14; gth=1/1.5e6; T0=300;
Vb=1.1; Rb=1e3; C=10e-9;
Rs=200;
```

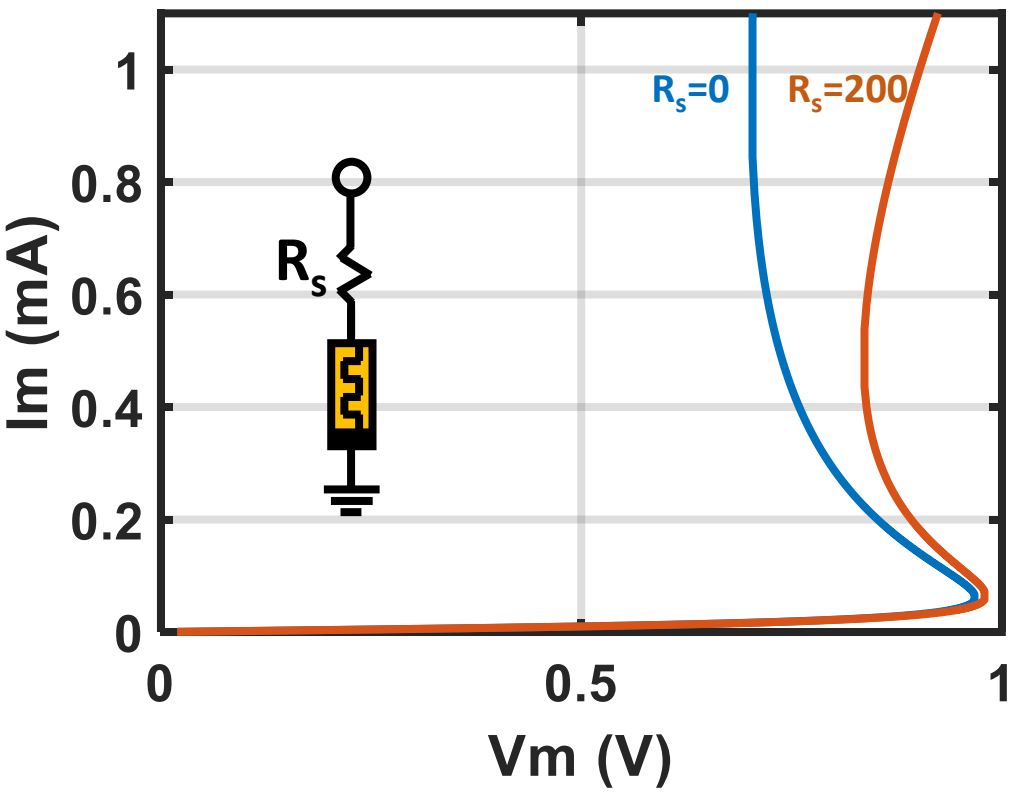
Initial conditions

```
T_init = 300; Vc_init = 0.001;
```

Solve the equations Matlab/Python
Try to obtain the same output waveform!



DC I-V characteristics



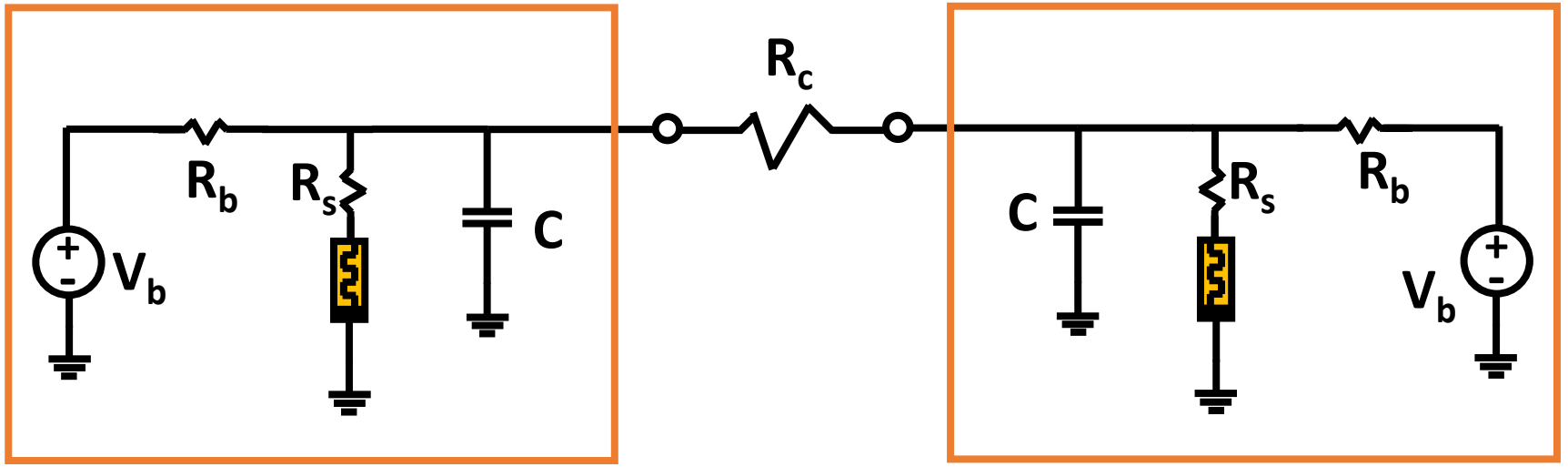
Define T as a parameter to be swept

```
T = 300.01 : 0.01 : 7000;
```

Set → $\frac{dT}{dt} = 0$

```
vmc = sqrt(gth*(T-T0)/G(T));
im = vmc*G(T);
vm = vmc*(1+Rs*G(T));
```

Try to obtain the same DC I-V characteristics yourself!



$$C\frac{dV_{c1}}{dt} = \frac{V_b - V_{c1}}{R_b} - G(T)\cdot V_{mc1} - (V_{c1} - V_{c2})/R_c$$

$$C\frac{dV_{c2}}{dt} = \cdots$$

Try to write down the equations and simulate if possible!