Table of Contents


```
function [data] = sim_rccopy(Vin, varargin)
```

Generate a circuit with the diagram above. Description: At t = 5 ms, the switch closes, and the second capacitor becomes part of the circuit. This causes the time constant to change, which changes the capacitor voltage oscillation to change, and because of the extra capacitor, the initial amplitude changes as well.

```
%Resistor, in ohms
R = 10000;
%Possible capacitor values, in farads
possible_C = [.00047, .001, .0022, .0047, .01, .022]*10^(-6);
%Pick a random value from the 5 options, or assign the defined value
if isempty(varargin)
    C = randsample(possible_C,1);
else
    C = varargin{1};
end
```

Feed the input voltage step function through the circuit

```
%Measure voltage across capacitor as the output, which we will call
 Vout
%Assume Vout(0)=0, uncharged capacitor

%Create a 10ms time vector, in ms, sampled at 10MHz
%time steps = 1/100MHz = 1*10^(-4)ms/sample
dt = 1e-4;
```

```
t=0:dt:10;
Vout = zeros(size(Vin));

%Create a generic function handle that will generate an output at each
 time
%point given the previous voltage time since last sample, dt
R2 = 10000;
rc_fxn = @(Vin, Vout_0, dt, R, C)Vin+(Vout_0-Vin)*exp(-(dt/1000)/
(R*C));

C2 = 47*10^-9;
for k = 2:50000
    Vout(k) = rc_fxn(Vin(k), Vout(k-1), dt ,R+R2, C);
end
for k = 50001:length(Vin)
    Vout(k) = rc_fxn(Vin(k),Vout(k-1),dt,R+R2,C+C2);
end
```

```
Not enough input arguments.

Error in sim_rccopy (line 25)
Vout = zeros(size(Vin));
```

Plot response if the capacitor value is unknown

```
if isempty(varargin)
    figure; plot(t,Vout)
    ylabel('Voltage across C1 (V)')
    xlabel('Time (ms)')
    axis([0,10, -0.5,4.5])
end
```

Log data in output struct

```
data = struct('R',R, 'C',C ,'Vout',Vout);
```

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