

LED and Photodetectors

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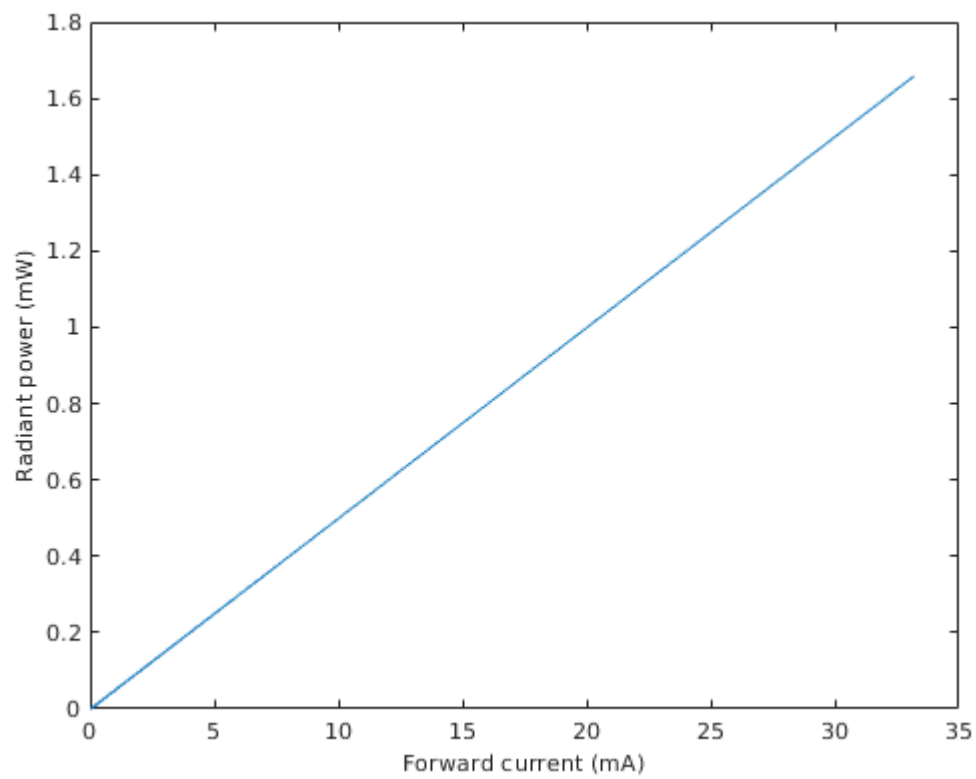
This code was developed by Miodrag Bolic for the book PERVASIVE CARDIOVASCULAR AND RESPIRATORY MONITORING DEVICES

LED

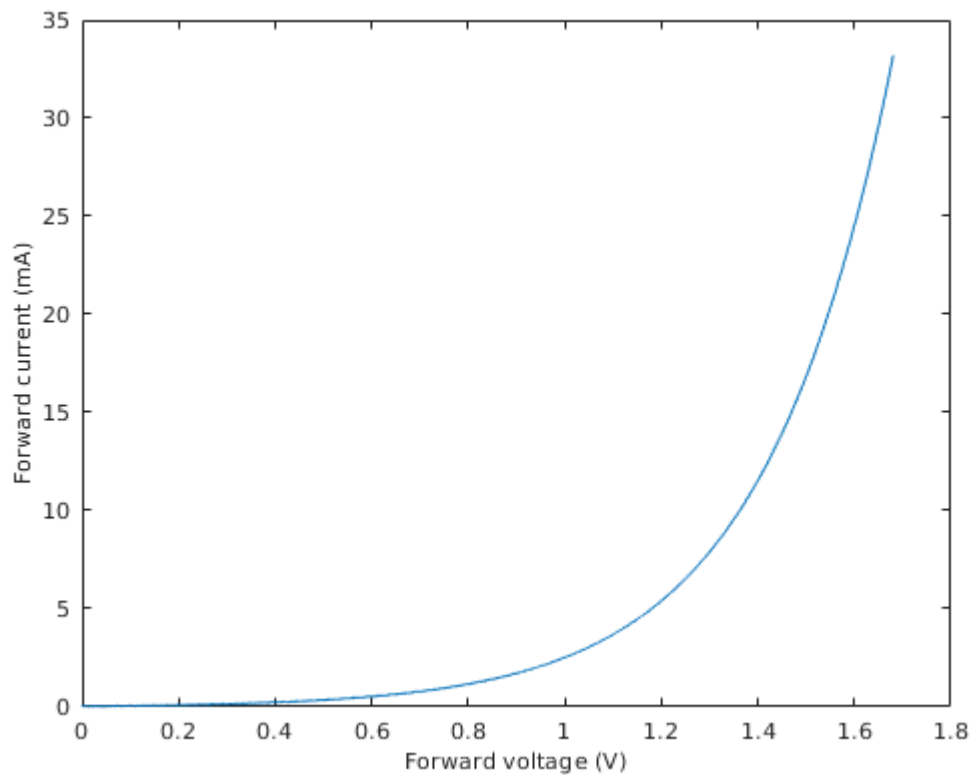
```
clear all
Vin(:,1)=0:0.01:10; %time;
Vin(:,2)=0:0.01/2:5;
% model_name = 'LED2';
% open_system(model_name)
% V = sdo.getParameterFromModel(model_name, 'V');
simOut = sim('LED2', 'CaptureErrors', 'on');
```

```
Warning: Matching "Goto" for "From" 'LED2/LED W/From1' not found
Warning: Matching "Goto" for "From" 'LED2/LED W/From3' not found
Warning: Matching "Goto" for "From" 'LED2/LED W1/From1' not found
Warning: Matching "Goto" for "From" 'LED2/LED W1/From3' not found
```

```
figure
plot(simOut.current_out.Data*1000,simOut.Power_out.Data*1000)
xlabel('Forward current (mA)', 'FontSize', 10)
ylabel('Radiant power (mW)', 'FontSize', 10)
```



```
figure
plot(simOut.diode_out.Data, simOut.current_out.Data*1000)
ylabel('Forward current (mA)', 'FontSize', 10)
xlabel('Forward voltage (V)', 'FontSize', 10)
```

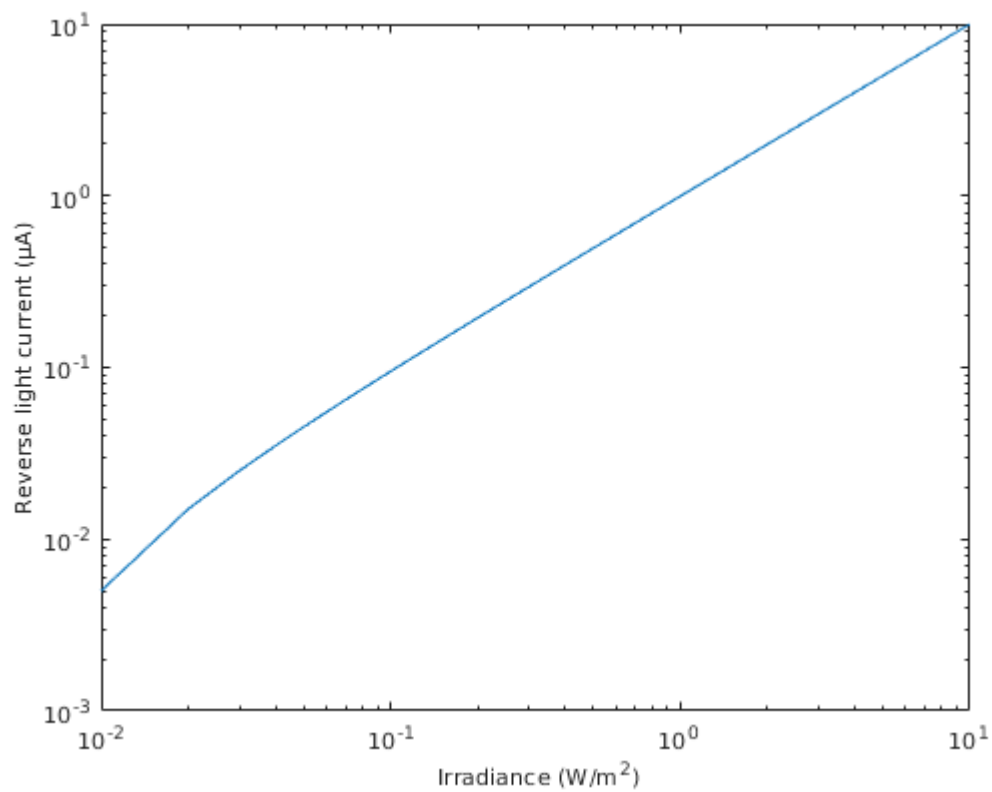


```
% plot(-simOut.diode_out.Data,-simOut.current_out.Data*1e6)
% xlabel(' Reverse Voltage (V)', 'FontSize', 10)
% ylabel('Reverse Light Current (μA)', 'FontSize', 10)
%
%
% clear all
% Irr1(:,1)=0:0.01:10; %time
% Irr1(:,2)=10; % irradiance
% Vin(:,1)=0:0.01:10; %time;
% Vin(:,2)=-5:0.01:5;
% simOut = sim('photodiode', 'CaptureErrors', 'on');
% hold on
% plot(-simOut.diode_out.Data,-simOut.current_out.Data*1e6)
```

Photodetector

```
clear all

Irr1(:,1)=0:0.01:10; %time
Irr1(:,2)=0:0.01:10; % irradiance
Vin(:,1)=0:0.01:10; %time;
Vin(:,2)=5;
simOut = sim('photodiode', 'CaptureErrors', 'on');
figure
loglog(Irr1(:,2),simOut.current_out.Data(1:length(Irr1(:,2)))*1e6)
xlabel(' Irradiance (W/m^2)', 'FontSize', 10)
ylabel('Reverse light current (μA)', 'FontSize', 10)
```



```
%%
clear all
Irr1(:,1)=0:0.01:10; %time
Irr1(:,2)=0.1; % irradiance
Vin(:,1)=0:0.01:10; %time;
Vin(:,2)=-5:0.01:5;
simOut = sim('photodiode', 'CaptureErrors', 'on');
figure
al=plot(-simOut.diode_out.Data,-simOut.current_out.Data*1e6)
```

```
al =
  Line with properties:

      Color: [0 0.4470 0.7410]
  LineStyle: '-'
  LineWidth: 0.5000
    Marker: 'none'
  MarkerSize: 6
MarkerFaceColor: 'none'
      XData: [1×9178 double]
      YData: [1×9178 double]
      ZData: [1×0 double]
```

Show all properties

```
xlabel(' Reverse voltage (V)', 'FontSize', 10)
ylabel('Reverse light current (µA)', 'FontSize', 10)
```

```

Irr1(:,1)=0:0.01:10; %time
Irr1(:,2)=5; % irradiance
Vin(:,1)=0:0.01:10; %time;
Vin(:,2)=-5:0.01:5;
simOut = sim('photodiode', 'CaptureErrors', 'on');
hold on
a2=plot(-simOut.diode_out.Data,-simOut.current_out.Data*1e6)

```

```

a2 =
    Line with properties:

        Color: [0.8500 0.3250 0.0980]
    LineStyle: '-'
    LineWidth: 0.5000
        Marker: 'none'
    MarkerSize: 6
    MarkerFaceColor: 'none'
        XData: [1×8636 double]
        YData: [1×8636 double]
        ZData: [1×0 double]

```

Show all properties

```

xlim([-4,1])
legend([a1,a2],["0.1W/m^2","5W/m^2"])

```

