clc;

clear all;

K = 1.38e-23; % Boltzmann constant [J/K]

q = 1.60e-19; % Elementary charge [C]/charge ofelectron

Vocn= 32.9; % Open-current voltage at T1[See SunpowerA300 CellDatasheet.pdf

Iscn = 8.21; % Short-circuit current at T1 [A]. See SunpowerA300 CellDatasheet.pdf

Kv = -0.123; %Temperature voltage constant

Ki = 0.0032; % Temperature current constant

Ns = 54;% no of series cells

T = 35+273;%operating Temperature

Tn= 25+273;%Nominal Temperature

Gn= 1000;%Nominal Irradiance

a= 1.3;%ideal constant Quality factor for the diode n=2 for crystaline, <2 for amorphous

Eg= 1.12;%Band gap of silicon % Voltage of the Crystaline Silicon [eV], 1.75eV for Amorphous Silicon

G= 1000;% actual Irradiation

Rs= 0.221;

Rp= 415.405;%Rs and Rp are calculated based on See SunpowerCurves or provided in data sheet of vendor(generally not specified so assumed)

Vtn= Ns\*(K\*Tn/q);

Ion= Iscn/((exp(Vocn/(a\*Vtn)))-1);

Io=Ion\*((T/Tn)^3)\*exp(((q\*Eg/(a\*K))\*((1/Tn)-(1/T))));

Ipvn=Iscn;

Ipv=(Ipvn+Ki\*(T-Tn))\*(G/Gn);

Vt=Ns\*(K\*T/q);

I= zeros(330,1);

i=1;

I(1,1)=0;

for V=0:0.1:32.9;

I\_part = Io\*(exp((V+(I(i,1)\*Rs))/(Vt\*a)-1)+((V+Rs\*I(i,1))/Rp));

I(i+1)=Ipv-I\_part;

V1(i)=V;

P(i)=V\*I(i);

i=i+1;

end

V1(i)= V1(i-1);

P(i)=P(i-1);

V1= transpose(V1);

subplot(2,1,1);

plot(V1,I);

subplot(2,1,2);

plot(V1,P);