MATLAB Model for PhotVoltaic Module

%%%%%%%%%%%%%%%%%%Matlab Source %%%%%%%%%%%%%%%%%%%%%%%%%%
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```
clear all;
close all;


TaC_ar = [ 70.0 40.0 20.0 0.0 ];
for t_idx = 1: 4
V_st = 0.0;
V_inc = 0.1;
V_cur = V_st;
for v_idx = 1:250
A_idx = 1;
%%Ideality constant varies depends pn PV technology

A_list = [
1.2 %%1 Si-mono
1.3 %% Si-poly
1.8 %% a-Si-H
3.3 %% a-Si-H tandem
5.0 %% a-Si:H Triple
1.5 %% CdTe
1.5 %% CIS
1.3 %% AsGa
];
A = A_list( A_idx);
Va =V_cur;
V_ar(v_idx) = Va;
V_cur = V_cur + V_inc;
Suns = 1;
TaC = TaC_ar(t_idx);
% Data of solar MSX-60
% G =  (1 Sun = 1000 W/mˆ2)
% T = Temperature in degree Celsius
k = 1.38e-23; %  Boltzman's  Constant
q = 1.60e-19; %  Electron Charge
% Enter the following constants here :
% calculate based on To :  1000Watt/m^2
n=1.2; % Diode quality factor
% n = 2 for crystalline < 2 for amorphous
Vg = 1.12; % Voltage band, 1.12eV for xtal If
% 1.75 % for amorphous Si .
Ns = 36; % Numer of cells in series
T1 = 273 + 25;
Voc_T1 = 21.06 /Ns;
% Open circuit voltage per cell at temperature T1
```

```
Isc_T1 = 3.80;
% Short circuit current cell temperature T1
T2 = 273 + 75;
Voc_T2 = 17.05 /Ns;
% Open circuit voltage per cell at temperature T2
Isc_T2 = 3.92;
% Short circuit current cell temperature T2
TaK = 273 + TaC; % Working temperature under
K0 = (Isc_T2 - Isc_T1)/(T2 - T1); % Equation ( 4)
IL_T1 = Isc_T1 * Suns; % Equation ( 3)



IL = IL_T1 + K0*(TaK - T1); % Equation (2)
I0_T1=Isc_T1/(exp(q*Voc_T1/(n*k*T1))-1);
I0= I0_T1*(TaK/T1).^(3/n).*exp(-q*Vg/(n*k).*((1./TaK)-(1/T1)));
Xv = I0_T1*q/(n*k*T1) * exp(q*Voc_T1/(n*k*T1)); % Equation (8)
dVdI_Voc = - 1.15/Ns / 2;
% DV / dI at Voc per cell from the manufacturer garficas

% Series resistance Rs per cell

Rs = - dVdI_Voc - 1/Xv; % Equation (7)
Vt_Ta = A * k * TaK / q; % = A * kT/q
Vc = Va/Ns;
Ia = zeros(size(Vc));
% Method of Newton
for j=1:5;
Ia = Ia - (IL - Ia - I0.*( exp((Vc+Ia.*Rs)./Vt_Ta) -1))./(-1 - (I0.*( exp((Vc+Ia.*Rs)./Vt_Ta)
-1)).*Rs./Vt_Ta);
end
if Ia < 0.0
Ia = 0.0;
endif
I_ar(v_idx) = Ia;
end


plot( V_ar , I_ar);
hold on;
end;
title(' PV Cell V-I Model for Temperatura from 70 ,40, 20 and 0 degree centigrade ');
xlabel( 'Voltage');
ylabel('Current');
grid;
hold off;

%%%%%%%%%%%%%%%%Matlab Source %%%%%%%%%%%%%%%%%%%%%%%%
%%%End pf  Matlab Model for Photo Voltaic Module
%%%%%%%%%%%%%%%%%%Matlab Source %%%%%%%%%%%%%%%%%%%%%%%%
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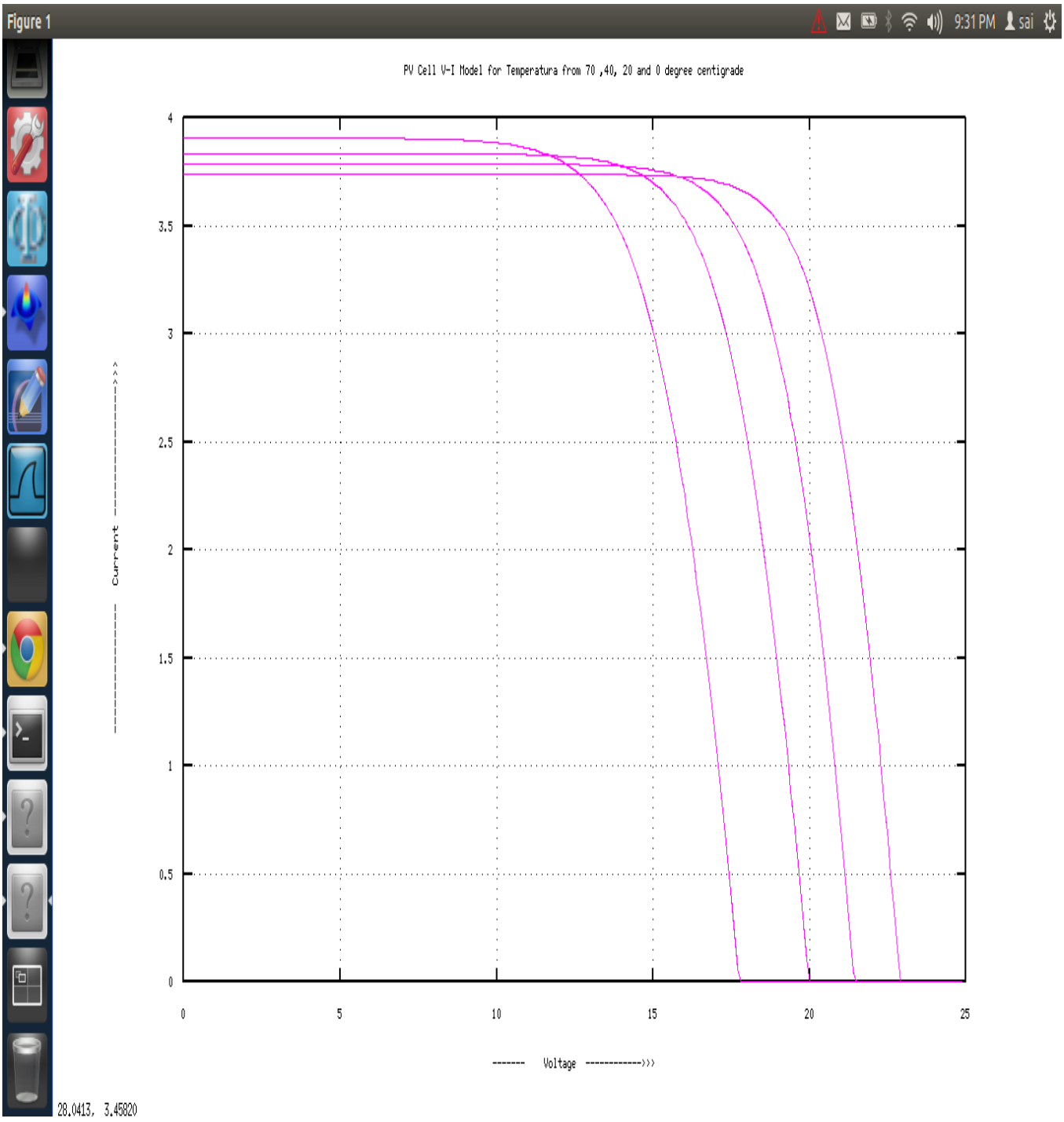
PhotVoltaic Matlab Model response curves



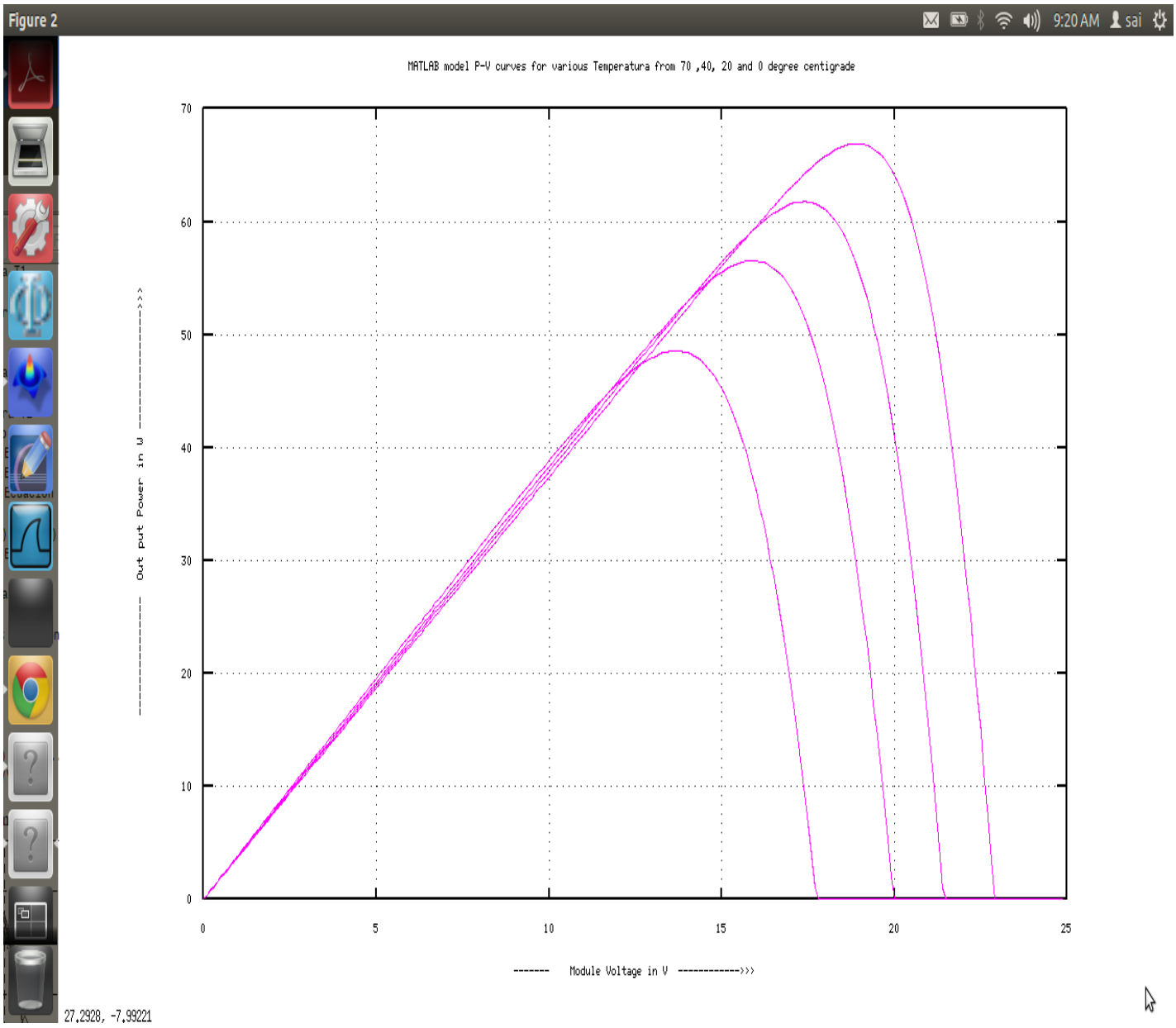


Figure 2
9:20 AM sai
MATLAB model P-V curves for various Temperatura from 70 ,40, 20 and 0 degree centigrade
Out put Power in W
70
60
50
40
30
20
10
0
0
5
10
15
20
25
Module Voltage in V
27.2928, -7.99221