Indian Institute of Science
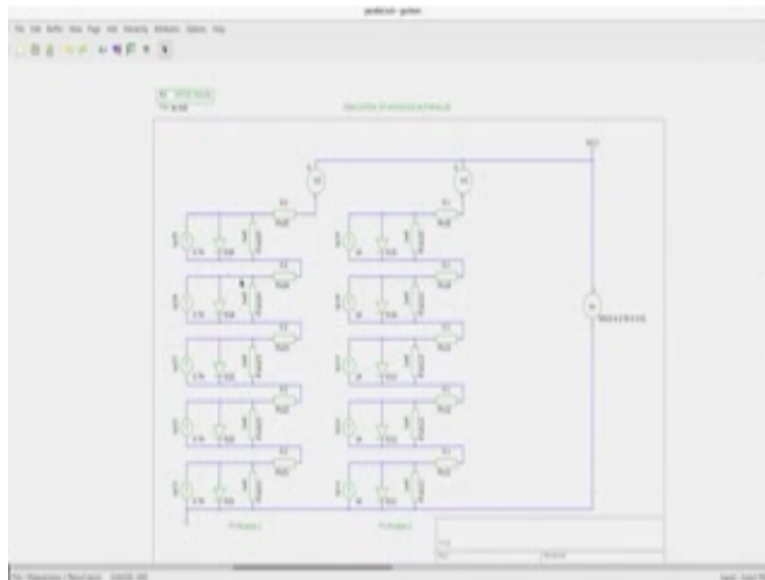
Design of Photovoltaic Systems

Prof. L .Umanand
Department of Electronic Systems Engineering
Indian Institute of Science, Bangalore

NPTEL Online Certification Course

(Refer Slide Time: 00:19)

The circuit here shows two modules one set of module PV module 1 contains 5cells in series by identical cells in series and another set of cells called PV module 2 they are also connected in series and there are also identical cells only the only thing is that the insulation source current is lesser indicating that PV module 2 is having partial shading now these two modules are connected in parallel and connected to the external load the external terminals is terminated with the source V^0 which is acting as a sweep voltage.

These two sources are 0 voltage sources they are put in here to measure the currents this source will measure I use I_1 current of module 1, this will measure I_2 current of module 2, I have also changed the series resistance values so that this two modules will not be exactly same even for the V_{oc} points there will be some difference of course one could also change the diode models between these two modules.

(Refer Slide Time: 01:50)
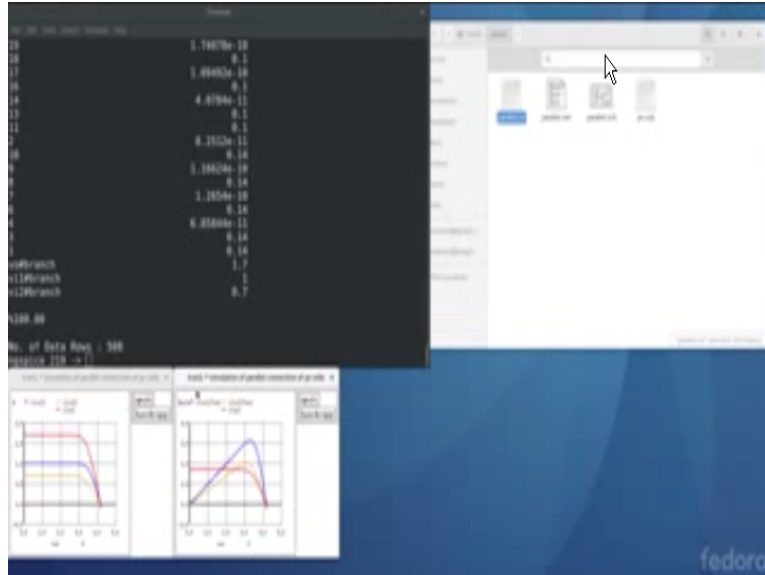
But I will leave it as an exercise for you to do now let us go to the terminal window and generate the net list you see that we are using parallel SCH as the input file and output file is parallel dot net so executing that we now have generated the parallel dot net, net list parallel dot ACH is the circuit file that we just now saw PV dot sub is the file that contains the diode model and the link parallel rata CH now parallel dot Syria is a circuit file containing the analysis I refer to the transient analysis include two parallel dot net the net list file and some control statements.

The standard one set by Brown has wide set foreground as black run the simulation and up of two plots plot one the first plot is I versus V not the terminal voltage I of module 1 versus terminal voltage I of module 2 versus the terminal, terminal voltage the second part so the first plot is IV character is a second plot with reference to this IV characteristic I versus V terminal you have I_1*V terminal which is the power of module 1, versus the voltage and power of module 2 versus the voltage these two plots will get executed and display.

(Refer Slide Time: 03:52)
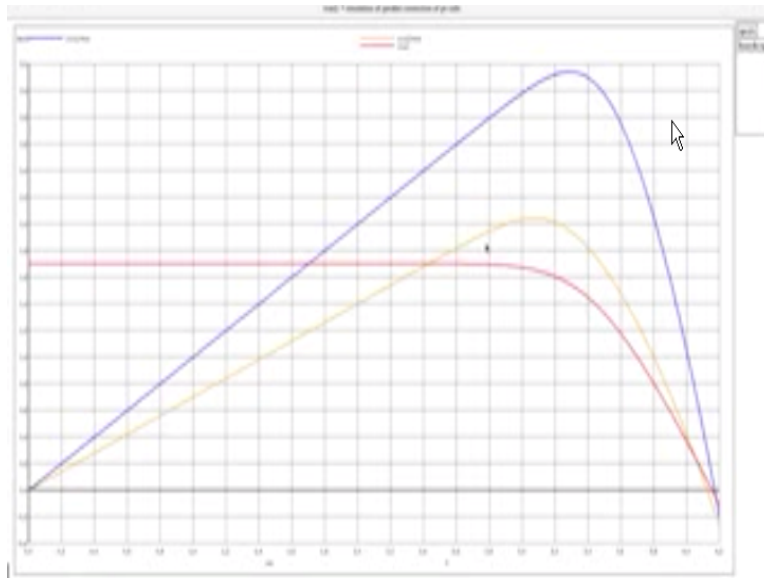
So now let us go into NG spice and call parallel dot area and run the simulation the simulation gets run two plots are displayed the first one here is the IV characteristic so this is IV characteristic of recur cells that is module 2, this is IV characteristic of module 1and these two get added up and then here you have the IV characteristic of the combined parallel module set now the other plot this is IV characteristic of the entire module.

And then you how the power versus voltage curve this blue one is the power versus voltage curve of module one and this light orange colored one is the power versus voltage curve of module two and you see that the module two is going into the fourth quadrant negative the power is becoming negative and this is the reason where it goes into the dissipation more to the sinking mode to avoid this we of course put a series diode our diode in series and try to protect the PV panels.