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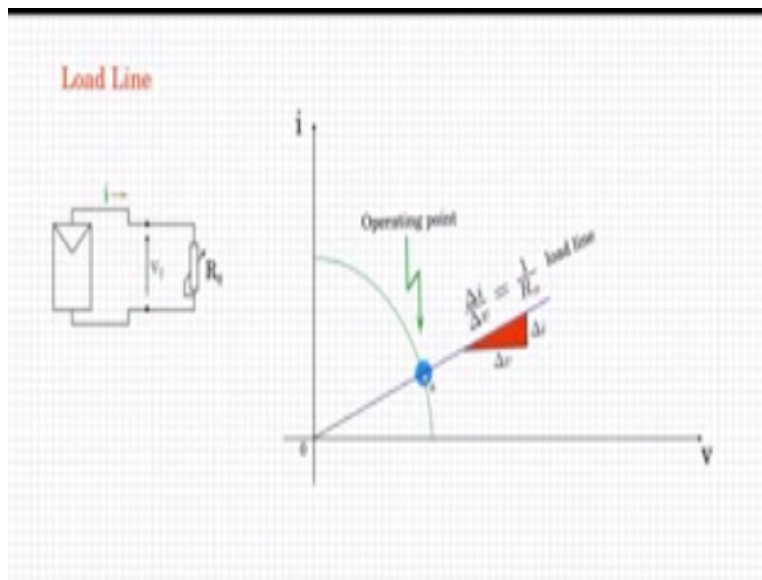
Design of Photovoltaic Systems

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

NPTEL Online Certification Course

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Let me introduce you so the concept of load line, load line on the IV characteristic of the PV7 come to the PV shall connected to an external load, say external load is R_0 and thus UKβ is variant let us see what happens if R_0 is variant from 0 to ∞ 0 I mean short circuit T the diagonal or not ∞ in open the circuiting the diagonal, now let us plot the idea characteristic the x axis is Vd the diagonal voltage y axis is the current row the external load so this would be our x and y axis and on to this axis let us place an part πV curve so let us say we have a curve like this.

Let me now draw a line a straight line like this what does this line represent, consider the slope of this line so the vertical entrap will be the Δi and the horizontal projection is ΔV and the slope is Δi / ΔV for Δi where ΔVe = 1 / R_0 so 1/ external output impatience as seen between these both diagonals, so this line any line you draw like this from the origin straight line cutting the iV

curve would represent $1/R_0$ and $1/R_0$ line and that line is called a load line. The point of the intersection of the load line with the iV curve.

Is this and this point of intersection is called the operating point, so if you draw until arbitrary load line the point of intersection with the iV curve would be the operating point for that load or not so for this load represented by $1/R_0$ line the operating point in iV curve is this.

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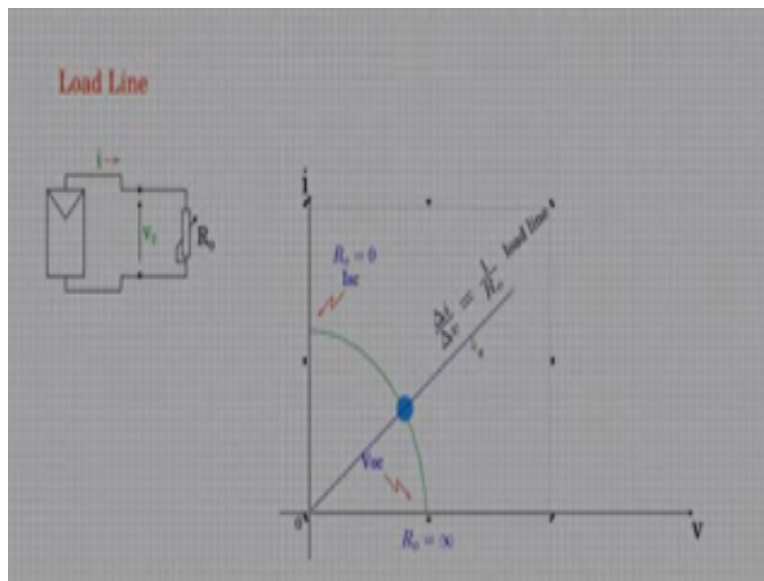
In this circuit in the system if R_0 is varied the slop of the load line will vary and R_0 A is made very high open circuit in fact and what will happen to the load line, the load line will move such that it will try to align itself the x axis this is because R_0 is open circuit infinite value $1/\infty0$ which means a slop is 0 $\Delta i0$ so you will see that in this load line and the intersection of the iV curve the operating pint is here, and this is the VOC point at the VOC point $R_0 = \infty$ now if we change R_0 such that there is a short circuit.

Across the terminals of the Pv cell such that $R_0 = 0$ and what happens to the load line the load line will move in this fashion and it will try to become vertical and align itself with the y axis like this because now $R_0 = 0$ $1/R_0$ is ∞ the slop is un infinite value, and therefore it is aligning itself in the y axis now this is the short circuit operating point, at short circuit operating point R0 $= 0$ in between these two operating points there are most to other operating points at different, R0 values and it will take this slopes according to $1/R_0$ value.

So this load line and this concept the load line will help you to gain a great inside into the operation of the circuits connected with the PV source you will see that we were using the load line concept more and more in many of our discussions and understanding of circuits that will come in the future.