Fundamentals of Power Electronics
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Lecture – 37
Efficiency of series

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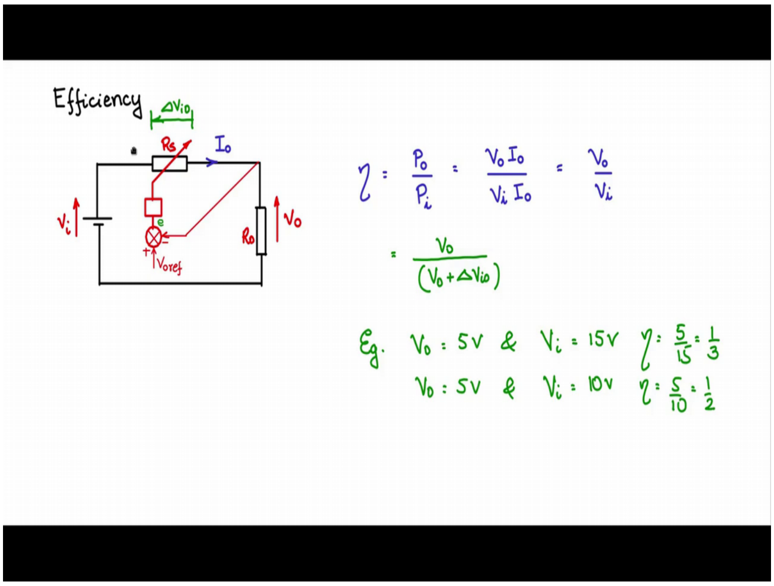

What is the efficiency of the series regulator? So, you see the circuit you have in the power loop just three components, you have the input source V i, you have R s and you have R naught. So, efficiency is given by P naught by P i. If, I naught is flowing in this power loop, you have P naught is V naught into I naught, and it is a same current I naught which is flowing through the input source also. So, we have V i into I naught, and efficiency simply v naught by V i.

So, if the input output differential is very large, then you will see that the efficiency is low. If the output is very close to the input comparable to the value of V i, then you will see that the efficiency is high. Let me rewrite the efficiency as V naught divided by V i can be replaced with V naught plus delta V i o that is a input output differential. Now, as you see that as the input output differential is very large if it starts becoming larger, then the efficiency goes down.

So, an example say V naught is 5 volts, and V i is 15 volts input output differentially is 10. So, you have 5 by 15, which is efficiency one-third 33 percent. For the same 5 volts, if V i is 10 volts, then efficiency is 50 percent 1 by 2. So, if you see that the difference between V naught and V i if it starts becoming smaller and smaller efficiency is better and in fact that is the reason the low dropout regulators, where the input output differential is small how much higher efficiency.