DC Power Transmission Systems
Prof. Krishna S
Department of Electrical Engineering
Indian Institute of Technology, Madras

Lecture – 20
Average power on AC and DC sides in a 6 pulse LCC neglecting inductance

So, we got an expression for the average value of the AC side power as well as the DC side power. So, we saw that they should be same because the instantaneous values of these powers are same.

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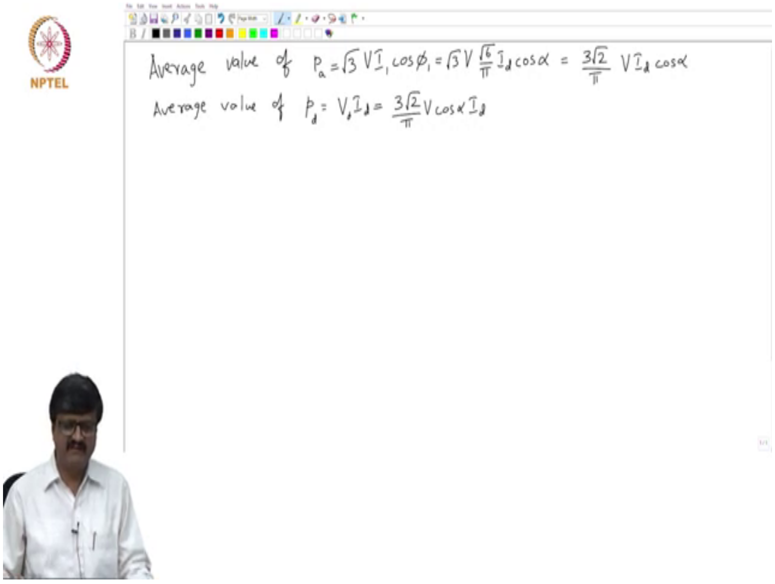

So, the average value should be in fact same. So, if I take the average value of the power which is supplied to the AC side of the convertor. So, you used an notation P a, So, subscript a for AC side. So, this is equal to root 3 times V I 1 cos phi 1. So, what comes here is only the fundamental component because there is no contribution of the harmonics to the power the average power in fact.

So, if you look at the average value of the DC side power, so, this is given by V d into I d, the current is any how a constant, the voltage on the DC side is a having an average value V d. So, we can verify that these two are one and the same. I mean; obviously, because instantaneous values are same. So, the average value should be same. So, what we can do is substitute for I 1, I 1 can be written in terms of I d. So, this is root 3 V I 1 is the rms value of fundamental component on the of the current on the AC side. So, this is equal to root 6 by pi I d.

So, if you have not derived this please derive this. I 1 is root 6 by pi I d, just by using for your series one can do that. And we know that phi 1 which is the phase angle by which the current on the AC side lags the corresponding voltage, we know that phi 1 is equal to means phi 1 is related to alpha. So, phi 1 is equal to alpha. So, this can be simplified to 3 root 2 by pi V I d cos alpha ok. So, if you look at the average value of P d, so, V d is the average value of the voltage on the DC side.

So, we derived an expression for V d. So, that is 3 root 2 by pi V cos alpha into I d. So, obviously, I mean we should we see that the two expression are one and the same. So, thus this is just a verification something which is know even before we tried to get the expression for the average value of P d or P a ok.