Structural Reliability
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Lecture –33
Common Probability Distributions (Part - 04)

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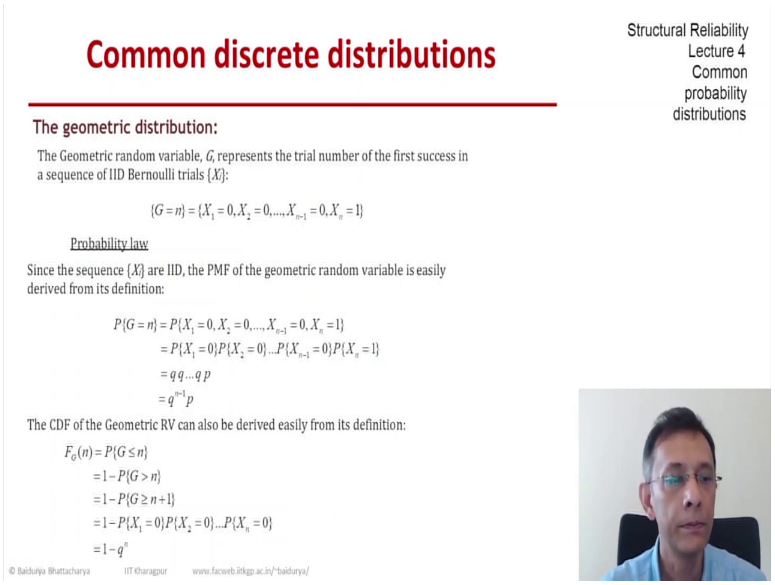

Let us start with the geometry distribution. So, G is the geometric random variable and if I write out the event that g is equal to n what I basically mean is the first success occurs at trial number n. So, which is saying the same thing as x1 is 0 which means the first one triad is zero the second vertical triad is zero all the way up to xn - 1 is 0 and xn is equal to 1. So, this is the expansion of the statement that G is equal to n.

Now we can then just use the independence of these successive Bernoulli trials all the x's and write out the probability of the joint event as the product and then use the fact that they are all identical. So, p of x1 equals 0 and x2 equals 0 all the way up to xn - 1 equals 0 they all have the probability of q and the last one has a probability of p and I can multiply all of them and the geometric PMF is q to the power n - 1 times p.

I can also find the CDF from very simple considerations I could add these first n terms and come up with the sum the first n PMF's to come up with the CDF but I can also use a simpler logic to say that the CDF of G at little n is the G is less than or equal to n which means the first success occurs at trial number n or before. So, which is one minus the probability that the first the first success occurs after trial number n. So, that is 1 - q to the power of n.