Structural Reliability
Prof. Baidurya Bhattacharya
Department of Civil Engineering
Indian Institute of Technology, Kharagpur

Lecture –29
Review of Random Variables (Part - 12)

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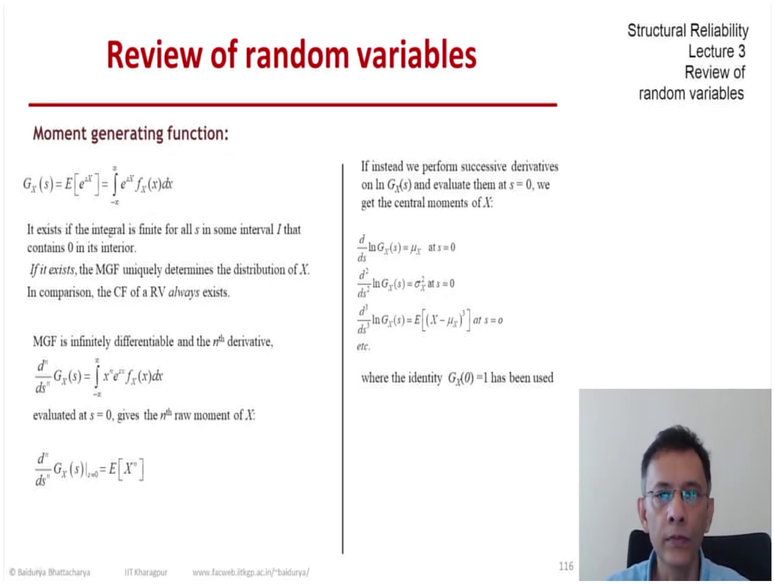

The moment generating function is the expectation as you see on the screen the expectation of exponential of s x, s is a real number and x is the random variable. Now if it exists then we can retrieve moments of all orders of the random variable from the generating function and in particular if you take the nth derivative of the homogeneity function and evaluate it at 0 for s you get the moment of order n.

And if you start with the log of the moment generating function you would get the central moments. Now there are other functions other expectations like the cumulative generating function which is the log of the characteristic function. The probability generating function for integer value random variables etc but we will not discuss them.

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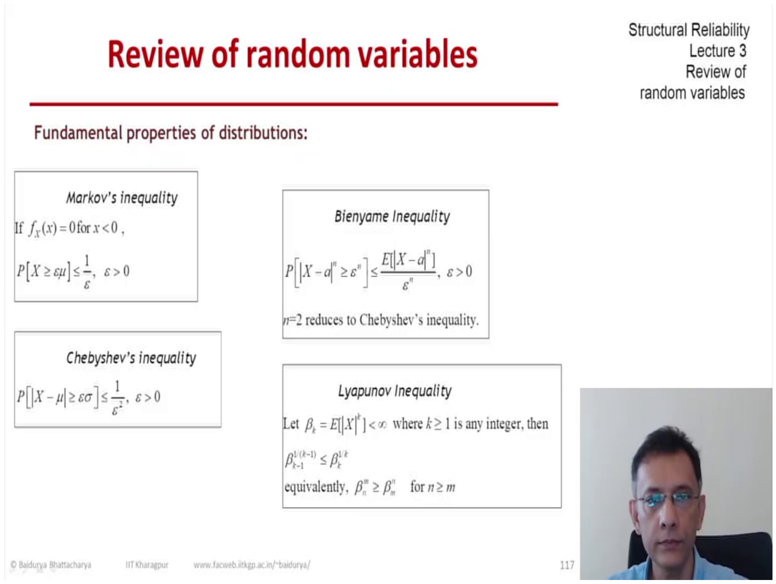

Let us move on to some non-parametric properties very powerful properties of random variables that involve some expectation of the other. The first one of them is the mark of inequality which basically tells you that as you move away from the mean you are going to find less and less probability content. The Chebyshev's inequality says the same thing which is generalized by the Bienyame inequality which reduces to Chebyshev's for n equals 2 and finally Lyapunov of inequality which gives a hierarchical order involving the expectations.