

Scales and noise

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What is randomness? What is noise?

Noise is anything we don't want, errors in measurements, thermostatic fluctuations in amplifier. In fact, nature seldom gives such gifts as no noise. We can think of randomness and noise as something we cannot predict fully, nor fully explainable. Jst because we cannot predict the outcome, it does not mean there is no physical law governing it. Randomness may very well have patterns and scales.

Nature itself comes also in all scales, we do not need to consider all scales to solve our problems. We work with an approximated system at an appropriate scale or a perturbation model to a perfect enclosed physical system. Sometimes the noise is very small, then we neglect them naturally. Sometimes they are very large, we also want to remove them, but in an intelligent way. I will discuss stochastic averaging, homogenisation, and very recent breakthroughs made with very recently developed analytical/probabilistic tools. These are governed by some of the universal laws.

This talk meant to be fun and fully accessible to a mathematical audience. I will touch on Analysis, Probability, and possibly Geometry.