Some features about random and stochastic modeling in Epidemiology

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Abstract

Stochastic and random models are being used to model many realistic phenomena from the real world. In fact, every happening in our world is affected by some randomness or stochasticity. Therefore, it is very important to decide which kind of stochastic or random model is the most appropriate to describe the behavior of the real one in the best way. We will provide some features about this problem in this lecture. Instead of providing a general or abstract theory on this topic, we will consider a random and another stochastic version of an epidemic model previously introduced and analyzed by Kloeden and Kozyakin [1]. In particular, the existence of a random attractor is proved for the random model and the persistence of the disease is analyzed as well. In the stochastic case, we consider some environmental effect on the model, in fact, we assume that one of the coefficients of the system is affected by some stochastic perturbation, and analyze the asymptotic behavior of the solutions. We will emphasize on the comparison between the two different modeling strategies and the usefulness of the theory of random attractors to analyze this and other models from the applied sciences.

References

[1] Kloeden, P. E., Kozyakin, V. S., The dynamics of epidemiological systems with nonautonomous and random coefficients, MESA: Mathematics in Engineering, Science and Aerospace, vol. 2, no. 2 (2011)

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