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FAKULTÄT
FÜR MATHEMATIK, INFORMATIK
UND NATURWISSENSCHAFTEN
Fachbereich Mathematik

Kolloquium über Mathematische Statistik und Stochastische Prozesse

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Extremal behavior of a class of stochastic processes in risk theory

Abstract:

Risk analysis plays a leading role within fields such as dietary risk, hydrology, nuclear security, finance and insurance and is more and more present in the applications of various probability tools and statistical methods. When assessing risks on a finite-time horizon, the problem can often be reduced to the study of a random sequence $C(N) = (C_1, \dots, C_N)$ of random length N, where $C(N)$ comes from the product of a matrix $A(N)$ of random size $N \times N$ and a random sequence $X(N)$ of random length N. This is in particular the case for the so-called Shot Noise Processes (SNP) that naturally arise in risk theory.
In this presentation, I will explain how to build a regular variation framework for such random sequences of random length and how to study their spectral properties. Then, I will expose a generalization of Breiman's Lemma that gives way to a tail estimate of $\|C(N)\|$ and I will show how this result provides many risk indicators such as the *ruin probability* and *the expected time over a threshold* on a finite-time horizon. Besides, to illustrate the applicability of the method, I will apply the main result on dietary risk assessment models.
I will finally focus on the dependence structure of an extension of the SNP by presenting an explicit formulae for the *extremal index*.

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