Forschungsgruppe Finanz- und Versicherungsmathematik
Fakultät für Mathematik
Technische Universität München

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Lecture in Actuarial Science

Dependence Models Generated via Line Integrals and Actuarial Applications

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Area: / Modulnr.: Mathematical Finance / MA5734

Course Structure: Lecture: 2h Exercises: 1h

Content: Functions describing the lifetimes. Basic univariate and bivariate life models. General introduction into the theory of hazard vector fields and line integrals. Exponential representation of multivariate continuous survival function via line integrals. Sibuya-type bivariate aging property and copula representations. Hazard potential. Discrete line integral on uniform grids - theory and probability interpretation. Actuarial applications - life paths presentation via line integrals and "life-giving" energy interpretation. Green's theorem and optimal path selection.

Prerequisite: MA0009 Introduction to Probability and Statistics

Literature:

Apostol, T. M. (1969): Calculus: Multi-variable Calculus and Linear Algebra, with Applications to Differential Equations, 2nd edn. New York: Wiley.
Dan Corro (2001). Modeling multidimensional survival with hazard vector fields. CAS forum, Winter
Hyman, J. M. and Shashkov, M. (1997): Natural discretizations for the divergence, gradient, and curl on logically rectangular grids. Computers & Mathematics Applications 33, 81-104.
Johnson, N. L. and Kotz, S. (1975): A vector multivariate hazard rate. Journal of Multivariate Analysis, 53-66.
Kolev, N. (2020): Discrete line integral on uniform grids: probabilistic interpretation and applications. Brazilian Journal of Probability and Statistics 34, 821-843.
Marshall, A. W. (1975): Some comments on the hazard gradient. Stochastic Processes and their Applications 3, 293-300.
Pinto, J. and Kolev, N. (2015): Sibuya-type bivariate lack of memory property. Journal of Multivariate Analysis 134, 119-128.
Pinto, J. and Kolev, N. (2016): A class of continuous bivariate distributions with linear sum of hazard gradient components. Journal of Statistical Distributions and Applications 3, 1-17.

Certificate: Exam, 5 CP

Location/ Lecture/Exercises: see TUMonline