From Stochastic Differential Equations to Piecewise Lipschitz Functions

Alexander Steinicke*
Joint work with G. Leobacher†and Z. Buczolich‡

Various phenomena in insurance dividend optimization or in modeling the energy market lead to stochastic differential equations (SDEs) with discontinuous drift terms and degenerate diffusion. In real world applications, such drift terms are multidimensional, with multidimensional discontinuities. Numerical schemes and rates for such equations have been given by G. Leobacher and M. Szölgyenyi (2016), requiring the points of discontinuity of the drift coefficient to be a smooth (C^4) manifold. On each separate region created by such a discontinuity manifold, the SDE's drift coefficient has to be Lipschitz. An attempt to generalize the assumption of a smooth discontinuity manifold to 'discontinuous' or 'irregular discontinuities' led directly to the question what 'piecewise Lipschitz functions' in several dimensions actually should be. This talk suggests a possible answer and some of its implications.

*Department of Mathematics and Information Technology, Montanuniversitaet Leoben
†Department of Mathematics and Scientific Computing, University of Graz, Austria
‡Department of Analysis, Etvs Loránt University, Budapest, Hungary