CALIBRATION OF STOCHASTIC VOLATILITY MODELS BY CONVEX REGULARIZATION

Jorge P. Zubelli

IMPA, Brazil

Resumo/Abstract:
Local volatility models are extensively used and well-recognized for hedging and pricing in financial markets. They are frequently used, for instance, in the evaluation of exotic options so as to avoid arbitrage opportunities with respect to other instruments. The PDE (inverse) problem consists in recovering the time and space varying diffusion coefficient in a parabolic equation from limited data. It is known that this corresponds to an ill-posed problem.
The ill-posed character of local volatility surface calibration from market prices requires the use of regularization techniques either implicitly or explicitly. Such regularization techniques have been widely studied for a while and are still a topic of intense research. We have employed convex regularization tools and recent inverse problem advances to deal with the local volatility calibration problem.
We describe a theoretical approach to calibrate the local volatility surface from quoted European option prices. The methodology has interesting connections with classical subjects in Finance and Optimization (convex risk measures) and with Statistics (Exponential families).
We investigate theoretical as well as practical consequences of our methods and illustrate our results both with real and with simulated data. This is joint work with V. Albani (IMPA), A. De Cezaro (FURG), and O. Scherzer(Vienna).