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On Option Pricing Methods in Modern Mathematical finance

Option pricing is one of the main research areas of modern Mathematical Finance. Hence, new valuable developments in this area remain well-motivated and highly desirable. The aim of the talk is to present some comprehensive issues that can be interesting also for a wider audience besides beside those experts who are directly working in Mathematical Finance. Moreover, the developments in option pricing can be considered as a reasonable source of new problems for further studies and research. In the talk a dual theory of option pricing will be developed by means of market completions as an alternative of the well-known option price characterization via martingale measures. Beside that we present another approach in option pricing which is based on comparison theorems for solutions of stochastic differential equations. It will be shown also how to use in option pricing the so-called partial/imperfect hedging technique that is concentrated around a statistical notion of "loss functions" and a financial notion of "risk measures". Finally, we will pay an attention to extensions of probability distributions of stock returns using orthogonal polynomials techniques. Going in this way we get a possibility to see what can happen beyond the Black-Scholes model.