IMEX Schemes for Pricing Options under Jump-Diffusion Models

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Partial-integro differential (PIDE) formulations are often used to price options under jump-diffusion models. Their discretizations lead to dense matrices or matrix blocks. With implicit-explicit (IMEX) time discretizations, solutions with these dense matrices can be avoided. We describe three second-order accurate IMEX schemes and show them to be stable under fairly mild stability conditions. Numerical experiments demonstrate the efficiency of these methods under one-dimensional Merton model and two-dimensional Bates stochastic volatility model.