Operator splitting schemes for option valuation under the two-asset Merton jump-diffusion model

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Under the two-asset Merton jump-diffusion model, the value of a European-style option satisfies a two-dimensional time-dependent partial integro-differential equation (PIDE) and the value of an American-style option satisfies a two-dimensional time-dependent partial integro-differential complementarity problem (PIDCP). We study a variety of recent and novel operator splitting schemes when applied to these problems, with a keen focus on implicit-explicit (IMEX) and alternating direction implicit (ADI) methods. Each of these schemes conveniently treats the nonlocal integral part in an explicit fashion. Through ample numerical experiments we investigate the convergence behaviour of the various splitting schemes and study their relative performance.

References

[1] L. Boen, *European rainbow option values under the two-asset Merton jump-diffusion model*, J. Comp. Appl. Math. 364, 112344, 2020.

[2] L. Boen & K.J. in 't Hout, *Operator splitting schemes for American options under the two-asset Merton jump-diffusion model*, Appl. Numer. Math. 153, 114–131, 2020.

[3] L. Boen & K.J. in 't Hout, *Operator splitting schemes for the two-asset Merton jump-diffusion model*, J. Comp. Appl. Math. 387, 112309, 2021.