# Numerical analysis for anisotropic multivariate Lévy processes

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**Abstract**

Arbitrage-free prices $u$ of financial derivatives on $d \geq 2$ assets are considered where the underlyings are modeled by Markov processes of Lévy type. They satisfy a high dimensional parabolic partial integrodifferential equation (PIDE) $\partial_t u + \mathcal{A}u = 0$ on $[0,1]^d$. Numerical pricing of these contracts by sparse Finite Element Methods requires the efficient discretization of the infinitesimal generator $\mathcal{A}$ of $X$.
For a wide class of operators we present a new sparse grid based wavelet compression scheme for *anisotropic* tensor product wavelets that (asymptotically) reduces the matrix complexity from originally $\mathcal{O}(h^{-2d})$ to $\mathcal{O}(h^{-1})$. Numerical results from joint work with C. Winter are presented for $d = 2$.

Keywords: Wavelet Compression, Sparse Tensor Products, Markov Processes, Lévy Copulas.

## References

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