Estimation of Delta-Gamma Sensitivities based on the Bismut-Elworthy-Li formula

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joint work with R. Avikainen and A. Neuenkirch

We introduce and analyse multilevel Monte-Carlo methods for the efficient computation of Greeks (the Delta and Gamma sensitivity) of security derivative prices with Lipschitz payoffs. Our approach is based on the Bismut-Elworthy-Li formula and for a given mean squared error ε^2 we provide algorithms that have computational cost of order $\log(\varepsilon)^2\varepsilon^2$. The theoretical findings are illustrated by numerical experiments.