Parareal Methods for Applications in Finance

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Abstract

We aim to show the interest of the parareal method (based on the work of Y. Maday and J.L. Lions) for the approximation of discrete problems based on backward scheme using least-squares regression i.e. the Longstaff-Schwarz algorithm, approximation of a backward stochastic differential equations. We propose a parallelization of the time discretization of the backward dynamic programming principle. It allows us to approximate simultaneously the solution at several time-steps. Here, we analyze this algorithm and the convergence of the parareal scheme. We also give some performance results. Because of its parallel scalability the method is well suited to fast evaluation of CVAs. This is a joint work with G. Pagès and O. Pironneau.

Keywords: *American option, backward dynamic programming, backward stochastic differential equations, least squares regression, parareal scheme.*

Short Biography: G. Sall is pursuing a Ph.D program in applied mathematics (quantitative finance) under the supervision of Pr. G. Pagès and Pr. O. Pironneau at the "Université Pierre et Marie Curie, Paris VI" (UPMC). It is a joint work with the laboratories LPMA[1] and LJLL[2], there is also a private company (GMS[3]) that supports this project and for which he is working as a Quant Researcher.

Fields of Research: Advanced Monte Carlo methods, High order derivatives and sensitivities, Automatic differentiation, Multilevel Monte Carlo, Approximation scheme, American option evaluation, Parallel computing.

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