Nesting Monte Carlo for high-dimensional Non Linear PDEs

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Abstract

A new method based on nesting Monte Carlo is developed to solve high-dimensional semi-linear PDEs. Depending on the type of non linearity, different schemes are proposed and theoreticaly studied : variance error are given and it is shown that the bias of the schemes can be controlled. The limitation of the method is that the maturity or the Lipschitz constants of the non-linearity should not be too high in order to avoid an explosion of the computational time. Many numerical results are given in high dimension for cases where analytical solutions are available or where some solutions can be computed by deep-learning methods.

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