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A new sampling strategy willow tree method with application to path-dependent option pricing

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Abstract

The willow tree algorithm, first developed by Curran in 1998, provides an efficient option pricing procedure. However, it leads to a large bias through Curran's sampling strategy when the number of points at each time step is not large. Thus, in this paper, a new sampling strategy is proposed. Compared with Curran's sampling strategy, the new strategy gives a much better estimation of the standard normal distribution with a small number of sampling points. We then apply the willow tree algorithm with the new sampling strategy to price path-dependent options such as American, Asian and American moving-average options. The numerical results illustrate that the willow tree algorithm is much more efficient than the least-squares Monte Carlo method and binomial tree method with higher precision.

Keywords:

American options | Applied mathematical finance | Derivatives pricing | Option pricing | Numerical methods for option pricing

JEL Classification :

G1 | G12 | G13

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