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A Convolution Method for Numerical Solution of Backward Stochastic Differential Equations

We propose a new method for the numerical solution of backward stochastic differential equations (BSDEs) which finds its roots in Fourier analysis. The method consists of an Euler time discretization of the BSDE with certain conditional expectations expressed in terms of Fourier transforms and computed using the fast Fourier transform (FFT). The problem of error control is addressed, we consider the extension of the method to reflected BSDEs, and some numerical examples are considered from finance demonstrating the performance of the method.