High-performance pricing of American options

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We develop a new high-performance spectral collocation method for the computation of American put and call option prices. The proposed algorithm involves a carefully posed Jacobi-Newton iteration for the optimal exercise boundary, aided by Chebyshev polynomial interpolation on a certain transformation of the boundary. The resulting scheme is straightforward to implement, easy to parallelize, and converges at a speed several orders of magnitude faster than existing approaches. Computational effort depends on required accuracy; at precision tolerances similar to a 10,000-step binomial tree, say, the computational throughput of the algorithm is typically in the order of 60,000 option prices per second per CPU.