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Paul Eloë* (peloe1@udayton.edu) and **Yuchen Zhou**. *Pricing Multi-Asset American Options with Regime-Switching by Exponential Time Differencing Schemes.*

This paper is concerned with multi-asset American option pricing problems with regime-switching. It is well known that multi-asset American option prices can be modeled by higher dimensional generalizations of the original Black-Scholes equation. Due to regime coupling, this problem gives rise to a class of complex PDE systems with free boundary conditions. We first apply the penalty method approach to convert the free boundary value PDE system to a system of PDEs over a fixed domain for the time and spatial variables. Then the exponential time differencing Crank-Nicolson (ETD-CN) method is employed to solve the resulting system. In the case of two uncorrelated underlying assets, we establish an upper bound condition for the time step size and prove that under this condition the option values generated by the ETD-CN scheme satisfy a discrete version of the positivity constraint. In addition, we numerically compare the ETD-CN scheme with two other methods, namely the binomial tree method and the implicit penalty method. At the end of this paper, we numerically illustrate the second order convergence of the ETD-CN scheme without theoretical proof. (Received August 26, 2014)