

1125-VC-2178

**Davood Damircheli\*** (dd1424@msstate.edu), 410 Allen Hall, 175 President's Circle,  
Department of Mathematics and statistics, Mississippi State University, Starkville, MS 39759.  
*Pricing of boundary-linked assets by stochastic boundary value problems by using a new adaptive  
multiple shooting methods.*

With the growing sophistication of financial markets, investors are demanding new, more complex options products, tailored to their needs. In particular, there is an increasing number of financial assets whose values are contractually linked at certain periods of time, such as leases and rental agreements. An illustrative example is the English real estate lease market. The value of lease assets can be formulated by a second-order boundary value stochastic differential equation.

An adaptive multiple shooting method is proposed for solving the stochastic boundary problem. We illustrate the effectiveness of this approach on several standard test problems selected from the literature and compare it with other existing methods. We apply these ideas to study the valuation of boundary-linked assets and their derivatives.

Furthermore, we value boundary-linked derivatives using Malliavin calculus and Monte Carlo methods. We apply these ideas to value European call options of boundary-linked assets.

(Received September 19, 2016)