

ANALYTICAL SOLUTION OF AMERICAN CALL OPTION UNDER FRACTIONAL BLACK AND SCHOLES MODEL

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Abstract. The aim of this paper is to give an analytical solution of American call option generated by the fractional Black and Scholes model using the Adomian decomposition method.

Keywords. Pricing American Option; Fractional Black and Scholes Model; Adomian decomposition.

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1 Introduction

American options are prevalent in the financial markets. Their pricing problem is a challenge. Compared to the European options, the American ones are more complicated. They allow more springiness since they can be exercised at any time before the maturity. This problem has motivated the interest of academics and traders.

In the last years, several works look into the problem of the American pricing options generated by different models using several methods. The early exercise feature inherent in American options was related to a free boundary condition problem in mathematics (see Bensoussan [2], El Karoui et al. [6], Karatzas [10] and Longstaff and Schwartz [13]), which was very convoluted. For this reason, American options have no closed form solutions. The most popular one is the Black and Scholes model [3], which rests upon the concept that the stock price of the underlying asset is log-normally distributed conditional on the current stock price with a constant volatility.

The fractional calculus is invested in several fields. Lately, it has been integrated in the Mathematical finance [7],[8], [9],[12], and particularly designed to the pricing problem. For example [8], [9], [11], [12],[15] and [16] which are devoted for the pricing of the European option and [17] for the