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ON THE ANALYSIS OF BLACK–SCHOLES EQUATION FOR EUROPEAN CALL OPTION INVOLVING A FRACTIONAL ORDER WITH GENERALIZED TWO DIMENSIONAL DIFFERENTIAL TRANSFORM METHOD

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Abstract. This paper proposes alternative approach for the valuation of a European call option via Generalized Two Dimensional Differential Transform Method (GTDTM). The analysis of the Black-Scholes equation for a European call option involving fractional order with GTDTM is discussed. The fractional derivative is considered in the sense of Caputo. Also, it is assumed that the underlying asset price pays no dividend and follows the Geometric Brownian Motion (GBM). The fractional Black-Scholes equation for a European call option has been solved successfully using GTDTM. The valuation formula of a European call option with fractional order has been obtained. An illustrative example is also presented to measure the performance of GTDTM in terms of accuracy, effectiveness and suitability in the context of the Black-Scholes Model (BSM). The results show that GTDTM compares favourably and agrees with BSM. Moreover, GTDTM is found to be accurate, effective, suitable and a good approach for the valuation of a European call option with fractional order.

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