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EFFECT OF BROWNIAN MOTION AND NOISE STRENGTH VIA STOCHASTIC MODEL ADOPTING ENHANCED RATIONAL (G'/G)-EXPANSION METHOD

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Abstract. Fractional order nonlinear evolution equations are remarkable for their extensive real-world applications. The present study aims to acquire pertinent wave solutions of the fractional order stochastic Bogoyavlenskii equation (SBE) in the viewpoint of Stratonovich regarding multiplicative noise. An enhanced rational (G'G)-expansion scheme is imposed on the suggested model, which accumulates distinct solitary wave solutions in appropriate form. The researchers may depict sophisticated tangible phenomena in a wide range with the assistance of the well-furnished wave solutions found, as the governing equation provides an understanding of plasma physics, the wave of propulsion fluid flow, and the dynamic characteristics of shallow-water waves. Several achieved solutions portray renowned physical characteristics of nonlinear wave shapes. Various types of solitons are established graphically in 3D shapes such as periodic, anti-periodic, compacton, anti-compacton, bell, anti-bell, peakon, kink, anti-kink, cuspon, etc. Diverse 2D plots are included to make the wave velocity noticeable, while contour plots signify the involvement among the concerned variables. The graphical interpretations are brought out alongside the effects of noise strength and Brownian motion. The observation of the present whole work might fascinate researchers for future associated work by utilizing the advised method, which is efficient, productive, and concise.

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