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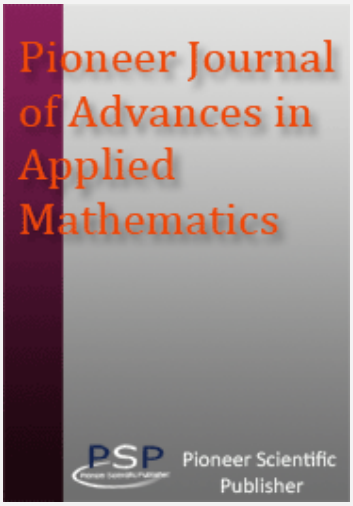

THE GENERAL FRAME WORK OF BLACK-SCHOLE'S OPTION PRICING MODEL WITH VOLATILE PORTFOLIO RISK MEASURE

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Abstract

This paper studies the nonlinear Black-Scholes equation on the strip $[0, T]\times \mathbf{R}^d$, with T a positive constant. We study the general discrete frame work of the solution of the PDE problem;

$$-\frac{\partial u}{\partial t} - \bar{k}^{ij}\frac{\partial^2 u}{\partial x^i \partial x^j} + k^i \frac{\partial u}{\partial x^i} + BF\left(\frac{\partial u}{\partial x^i}, \frac{\partial^2 u}{\partial x^i \partial x^j}\right) = \mathbf{0} \text{ in } \mathbb{Q}$$

$$u(x, \mathbf{0}) = g \text{ in } \mathbf{R}^d$$

with an operator given as

$$L(t, x) = \bar{k}^{ij}(t, x)\frac{\partial^2}{\partial x^i \partial x^j} + \frac{k^i(t, x)\partial}{\partial x^i},$$

where $\mathbf{Q} = [0, T]\times \mathbf{R}^d$, with $T \in (0, \infty)$ and f and g are given functions. The approximation study is pursued using finite difference methods.

Keywords and phrases: Zoomeron equation, dynamical system method, exact travelling wave solutions, phase portraits.