INTEGRO-DIFFERENTIAL INEQUALITIES
AND
THE IMPACT OF WHITE NOISE IN DYNAMIC MARKET MODELS

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ABSTRACT

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The research work was carried out in this project is two fold. In one direction some qualitative aspects of ODEs are investigated by obtaining upper bounds for the 1st derivative of the unknown function in Integro-differential inequalities. In the other direction two dynamic market models are considered by incorporating white noise to the systems via Wiener process. In the stock market model upper bounds for expectation and variance of the price function P(t) are investigated by obtaining the following results:

I. $$P(t) = P_0 \exp[\mu t - \frac{1}{2}\int_0^t \sigma^2 ds + \int_0^t \sigma \, dW]$$

II. $$E(P(t)) = P_0 \exp[\int_0^t \mu(s)\, ds] = P_0 e^{\mu t} \le P_0 e^{\mu T}$$

III. $V(P(t)) \le \|P^2\|_2 \|\sigma^2\|_2 e^{\mu^2 T}$; where $\mu > 0$ is called the "drift constant" and $\sigma(t)$ is called the "volatility function" of the stock market model.

In the FUPV-dynamic market model it is shown that time path of the price function is stochastically stable by establishing the following results:

I. $$P(t) = \left\{ \left[P_0 - \left(\frac{l}{m}\right) \right] e^{-jmt} + \left(\frac{l}{m}\right) + \int_0^t e^{-jmt(1-\frac{s}{t})} n(s) dW(s) \right\}$$

II. $$E(P(t)) = E(P_0) e^{-jmt} + \left(\frac{l}{m}\right)(1 - e^{-jmt})$$