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

A PROJECT REPORT PRESENTED BY

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to the Board of Study in Mathematics of the
POSTGRADUATE INSTITUTE OF SCIENCE

*in partial fulfillment of the requirement
for the award of the degree of*

MASTER OF SCIENCE IN INDUSTRIAL MATHEMATICS

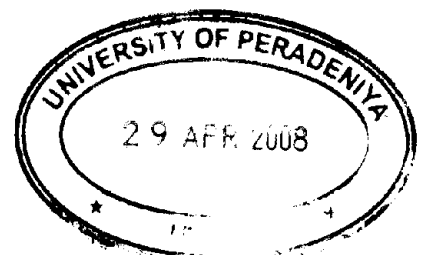
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UNIVERSITY OF PERADENIYA

SRI LANKA

2007

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ABSTRACT

INTEGRO-DIFFERENTIAL INEQUALITIES

AND

THE IMPACT OF WHITE NOISE IN DYNAMIC MARKET

MODELS

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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:

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

$$II. \quad E(P(t)) = P_0 \exp\left[\int_0^t \mu(s) ds\right] = P_0 e^{\mu t} \leq P_0 e^{\mu T}$$

$$III. \quad V(P(t)) \leq \|P^2\|_2 \|\sigma^2\|_2 e^{\mu^2 T}; \text{ where } \mu > 0 \text{ is called the "drift}$$

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:

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

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