APPROVAL SHEET

The report entitled Determination of Kanai – Tajimi Parameter Using Adaptive Filter is approved for the degree of M.Tech.

Examiners

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Shri G.P Awadhiya

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Date: Delhi

Place: _____

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DECLARATION

I declare that this written submission represents my idea in my own words and where other ideas or words have been included; I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be a cause of disciplinary action by the institute and also invoke penal action from the sources which have thus not been properly cited or from whom permission has not been taken when needed.

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ABSTRACT

Kanai – Tajimi parameters are used to characterize the strong ground motion. These parameters for different earthquake data are estimated from power spectral density vs frequency graph using spectral moments. In this thesis first earthquake signal is predicted from Adaptive filter then PSD vs frequency graph is obtained using low pass filter.

In order to monitor, the change with earthquake shaking, the Kanai –Tajimi parameters (i.e natural frequency and damping ratio of soil layer) are also identified based on windowed data of earthquake using a moving time window. This thesis provides a method for estimating dynamic variations of K-T frequency and damping ratio parameter of soil related very closely to the non-liner earthquake responses of ground. It is showed that nonlinear responses with great reduction in soil natural frequency and increase of soil damping ratio occurred during the strong ground motion. Such a reduction of K-T frequency parameter and increase in K-T damping ratio parameter was found to have time – varying characteristics, so the further topic of this study focused for analyzing non-stationary variation of K-T parameter.

Keywords: Ground motion, Normalized Least Mean Square Filter, Power Spectral Density, Kanai and Tajimi parameters.

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LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

m	mass of the system
c	damping constant
k	Spring constant
H(ω)	Transfer function
ω_g	natural frequency
G(ω)	Spectral Density Function
ξ_g	Damping ratio
U_s	absolute amplitude of seismic waves reaching the bottom boundary of the surface layer
T	Time period
r_{xy}	Cross-correlation
r_{xx}	Auto-correlation
w	Filter coefficient
μ	Step size of LMS filter
λ_j	jth Spectral moment
ω	Central frequency
δ	Shape factor