

REVISED
SPRING MASS DAMPER MODULE SIMULATION

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

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Vibration signature analysis is one of the most widely used techniques in industry for identifying faults in operating machinery. Beyond fault detection, it also serves as an effective method for studying system behavior over a defined time interval. Several tools are available for this purpose, including time-displacement curves, Fast Fourier Transform (FFT), frequency domain analysis, and signal processing techniques. In this study, vibration signature analysis is applied to a spring-mass-damper system to observe its dynamic response under both free and forced damped vibration conditions in different viscous fluid environments.

An experimental setup was constructed to model the spring-mass-damper system, and time-displacement curves were obtained through practical testing. These curves were then used as the primary tool for analyzing the system's behavior. To support the experimental findings, a theoretical model of the system was also developed using Python programming, allowing a direct comparison between simulated and real-world results. The study further examines the linearity of the system by analyzing its consistency across trials. Ultimately, the experimental and theoretical vibration signatures were compared to validate the results and better understand the damping effects in system design applications such as shock absorbers and vibration-resistant structures.

Keywords: Spring Mass Damper System, Vibration Signature, Time Displacement, Spring, Mass, Damper, Damping, Dynamic Response



DEDICATION

I dedicate this works for the future of the country I loved: Indonesia



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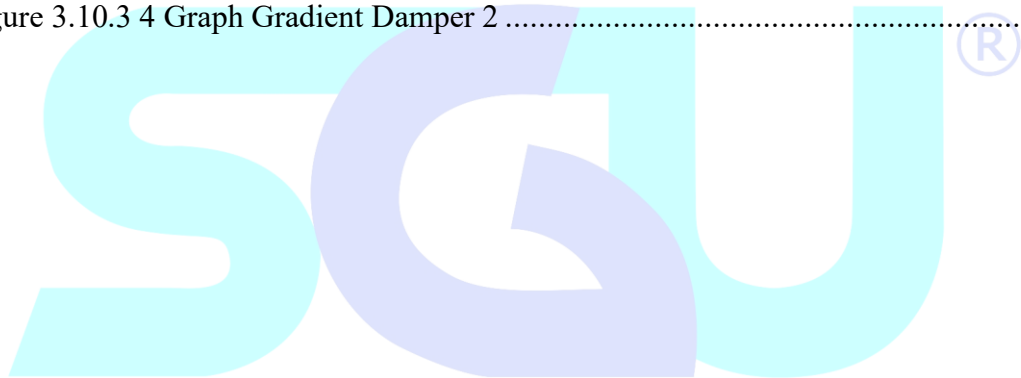
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