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MARA

PIONEERING EDUCATIONAL PERSPECTIVES

Series 2025



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Chief Editors:

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Muhammad Irfan bin Mokhtar

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Preface

Pioneering Educational Perspectives: Series 2025 is a collection of thought-provoking insights and research contributions exploring contemporary educational trends and practices. This eBook presents a diverse range of perspectives on innovative teaching methodologies, digital learning strategies, and transformative approaches in education. Designed to serve as a resource for educators, researchers, and practitioners, it aims to inspire meaningful discussions and advancements in the field. Through carefully curated chapters, this publication offers fresh ideas and practical solutions to enhance learning experiences in an ever-evolving educational landscape.

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VMATT - VIBRATION MAGNIFICATION AND ANGLE TEACHING TOOL

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ABSTRACT

The Vibration Magnification and Angle Teaching Tool (VMATT) is an advanced, interactive MATLAB-based graphical user interface (GUI) developed to significantly enhance the learning and comprehension of Single Degree of Freedom (SDOF) forced vibration systems. Specifically designed for third-year mechanical engineering students and professionals, VMATT enables users to explore and analyze real-time vibration behavior by adjusting key system parameters, including mass, damping constant, and spring constant. The tool dynamically generates graphical outputs for magnification factor and phase angle, offering immediate, insightful feedback on how the system responds to parameter variations. Additionally, VMATT accurately identifies the system's damping condition, classifying it as undamped, underdamped, critically damped, or overdamped, thereby providing a comprehensive analysis of the system's dynamic behavior. By offering both visual and numerical feedback, VMATT bridges the gap between theoretical concepts and real-world applications, making it an essential tool for educational purposes, professional training environments, and advanced research. Its potential for commercialization stems from its user-friendly interface, flexibility, scalability, and ability to simulate multiple case studies simultaneously, positioning it as an invaluable resource for teaching, learning, research, and industry-focused training in vibration analysis and mechanical engineering disciplines.

KEYWORDS: Vibration analysis, Magnification factor, Phase angle, Frequency ratio.

PROBLEM AND OBJECTIVE

Traditional methods for teaching vibration analysis in mechanical engineering heavily depend on static diagrams and mathematical equations, which can often be insufficient for students to grasp the complexities of dynamic vibration systems. These techniques limit engagement and do not offer the hands-on learning experience required to fully understand how mass, damping, and stiffness influence the behavior of Single Degree of Freedom (SDOF) forced vibration systems (Rosas & Fernández, 2022). As a result, students may struggle to translate theoretical knowledge into practical applications, leading to gaps in their comprehension and difficulty in solving real-world problems related to vibration analysis (Čech et al., 2014).

The primary objective of the Vibration Magnification and Angle Teaching Tool (VMATT) is to overcome these limitations by providing an interactive platform that bridges the gap between theoretical vibration concepts and their practical application. Developed using MATLAB, VMATT offers real-time manipulation of key parameters such as mass, damping constant, and spring constant, allowing students to visually observe the effects on magnification factor and

phase angle. This interactive feature significantly enhances the learning experience, as students gain immediate, visual feedback on how parameter changes affect system behavior (Čech et al., 2014).

Furthermore, VMATT goes beyond basic parameter adjustment by automatically determining the system's damping condition—whether undamped, underdamped, critically damped, or overdamped—giving students a comprehensive understanding of how damping impacts vibration response. By offering this level of interactivity and real-time feedback, VMATT transforms the learning process, making vibration analysis more engaging, accessible, and practical for both students and professionals in mechanical engineering. The ultimate goal is to provide a deeper, more intuitive understanding of vibration systems, empowering users to apply their knowledge effectively in academic and industrial contexts.

DESIGN DESCRIPTION

The Vibration Magnification and Angle Teaching Tool (VMATT) is a MATLAB-based graphical user interface (GUI) designed to enhance the understanding of Single Degree of Freedom (SDOF) forced vibration systems. Developed for third-year mechanical engineering students and professionals, VMATT serves as an interactive educational tool that bridges theoretical concepts with real-world applications, ensuring a deeper grasp of vibration principles.

The tool allows users to adjust critical system parameters—mass, damping constant, and spring constant—and visualize the resulting effects in real time. VMATT provides dynamic graphical outputs, including magnification factor and phase angle, making it easy for users to observe how changes in these parameters influence the system's behavior. Additionally, the tool classifies the system's damping condition (undamped, underdamped, critically damped, or overdamped) based on user input, offering a comprehensive understanding of the vibration response and system dynamics.

One of VMATT's unique features is its ability to simultaneously compare two different case studies, enabling users to analyze the effects of varying parameters side by side. This feature is particularly beneficial in academic settings, where students can explore multiple scenarios to better grasp the nuances of forced vibration. VMATT's user-friendly interface, flexibility, and capability to offer real-time feedback make it an indispensable teaching tool, with strong potential for commercial use in both educational and professional training environments. Additionally, its adaptability allows for future enhancements, updates, and expansions to meet evolving educational needs worldwide.

VISUALS

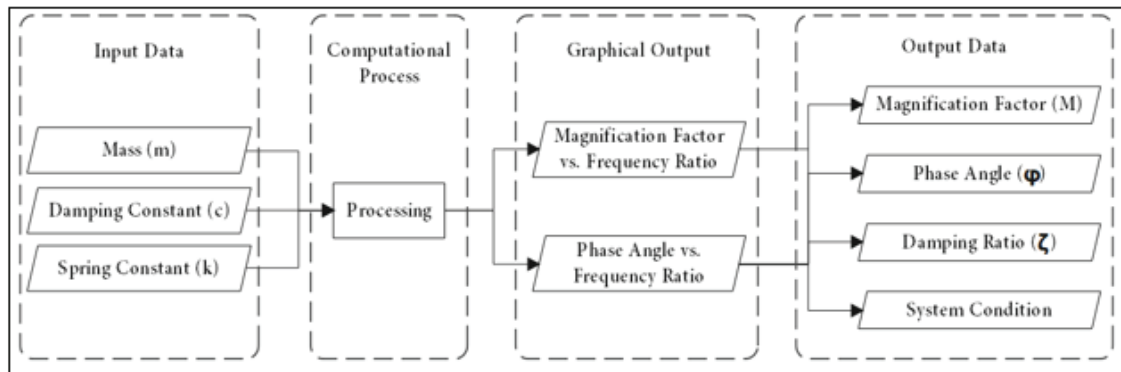


Figure 1: VMATT System Workflow

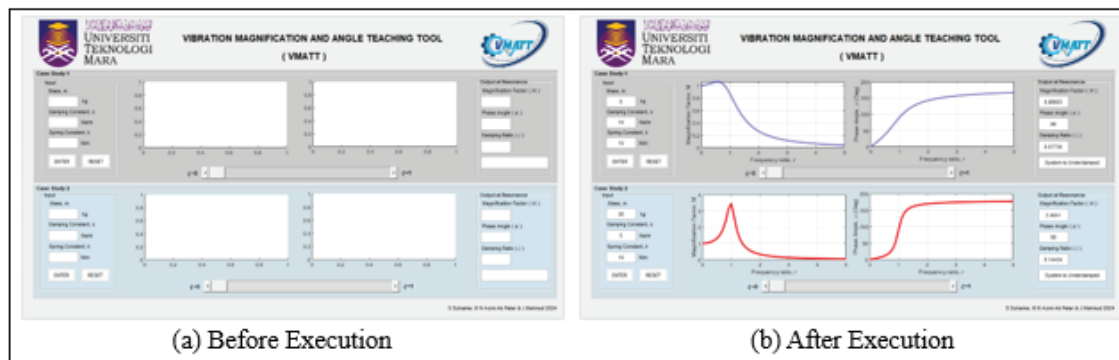


Figure 2: VMATT User Interface: Before and After Execution View

NOVELTY AND UNIQUENESS

The Vibration Magnification and Angle Teaching Tool (VMATT) is innovative due to its real-time interactivity and dual-case study comparison feature, which is rarely found in existing solutions. Unlike traditional tools that rely on static diagrams or complex calculations, VMATT allows users to adjust key parameters like mass, damping constant, and spring constant, while immediately visualizing the effects on magnification factor and phase angle. This provides users with a dynamic and hands-on learning experience, making the tool highly effective in bridging the gap between theoretical concepts and practical applications.

What truly sets VMATT apart is its ability to simultaneously compare two different case studies, offering side-by-side analysis of varying vibration parameters. Additionally, it automatically classifies the system's damping condition, reducing the need for manual input and simplifying the learning process. This unique combination of features makes VMATT a powerful and user-friendly tool, ideal for both educational and professional environments, ensuring a deeper understanding of vibration behavior and system dynamics.

BENEFITS TO MANKIND

The Vibration Magnification and Angle Teaching Tool (VMATT) enhances education by providing an interactive platform for understanding complex vibration systems, thus improving the learning experience for students and professionals alike. By simplifying the analysis of vibration behavior, VMATT helps develop more skilled engineers who can apply this knowledge in industries such as automotive, aerospace, and construction, leading to better-designed, safer systems. Additionally, by reducing the need for physical testing, VMATT

minimizes material waste and energy consumption, contributing to a more sustainable approach to engineering education and research.

COMMERCIAL POTENTIAL

VMATT has strong commercial potential, particularly in educational institutions, engineering firms, and professional training environments. Its user-friendly interface, real-time feedback, and ability to compare multiple case studies provide a competitive advantage over traditional teaching methods. VMATT's scalability allows it to be adapted for various educational levels and industry needs. It can be commercialized through licensing models or one-time purchases, making it accessible to universities and corporations. Additionally, its minimal hardware requirements and flexible software updates ensure a cost-effective solution with long-term market viability in the education and engineering sectors.

CONCLUSION

The Vibration Magnification and Angle Teaching Tool (VMATT) offers a powerful, interactive platform for understanding Single Degree of Freedom (SDOF) forced vibration systems. By enabling real-time manipulation of key parameters and providing immediate graphical outputs, VMATT bridges the gap between theory and practical application, making it an essential tool for both education and professional training. Its unique ability to compare multiple case studies simultaneously enhances learning and research in mechanical engineering, offering invaluable insights and fostering deeper comprehension of vibration behavior and system dynamics.

Looking ahead, future developments for VMATT could include expanding its capabilities to Multi-Degree of Freedom (MDOF) systems, integrating 3D visualizations, and adding more advanced analysis features, such as automated frequency response curves. This would broaden its application across various engineering disciplines and industries, further solidifying its value as a versatile, impactful, and innovative educational and research tool, with potential for global academic and industrial use in diverse engineering sectors.

REFERENCES

- Rosas, E. E. V., & Fernández, C. G. (2022). Pedagogical framework to develop interactive virtual tools for the teaching and learning of dynamic systems in Control Engineering. *IFAC-PapersOnLine*, 55(17), 218-223.
- Čech, M., Schlegel, M., Balda, P., & Reitingner, J. (2014). New tools for teaching vibration damping concepts: ContLab. eu. *IFAC Proceedings Volumes*, 47(3), 10580-10585.