

Mechanical Vibrations: Modeling and Measurement; Tony L. Schmitz, K. Scott Smith; 378 pages; 2011; Springer Science & Business Media, 2011; 9781461404606

Chapter 9 introduces vibration measurement and testing, and it discusses the hardware available to produce vibration of the system under test and to measure the response. Chapter 10 treats the vibration of systems that cannot be described adequately with lumped-parameter models consisting of ordinary differential equations. CHAPTER 1 INTRODUCTION TO MECHANICAL VIBRATION Units None of the modeling and analysis techniques we will develop depend on a specific system of units. In this book we use two systems of units, the SI and the US Customary System. Magnitude and angle: $r = \sqrt{x^2 + y^2}$ and $\theta = \tan^{-1}(y/x)$. Polar and exponential representation: $z = r e^{i\theta}$. Equality: If $z = r e^{i\theta}$ and $w = s e^{i\phi}$, then $z = w$ if and only if $r = s$ and $\theta = \phi + 2\pi n$, where n is an integer. Modeling and Measurement. Authors: Schmitz, Tony L., Smith, K Scott. Free Preview. Discusses model development using frequency response function measurements. Presents a clear connection between continuous beam models and discrete finite degree of freedom models. Includes MATLAB code for numerical examples that is integrated in the text narrative. Professor Schmitz has been working in mechanical vibrations for well over 15 years and has developed methods to enable mechanical engineers to apply vibrations fundamentals to common industrial problems. In addition he has assembled extensive course notes, case studies, exercises, problem sets and developed MATLAB code. A complete solutions manual is available as well. Show all. Mechanical Vibrations: Modeling and Measurement describes essential concepts in vibration analysis of mechanical systems. It incorporates the required mathematics, experimental techniques, fundamentals of model analysis, and beam theory into a unified framework that is written to be accessible to undergraduate students, researchers, and practicing engineers. To unify the various concepts, a single experimental platform is used throughout the text. In Chap. 6, we solved the "backward problem" of starting with frequency response function (FRF) measurements and developing a model. However, we did not describe the measurement procedure.