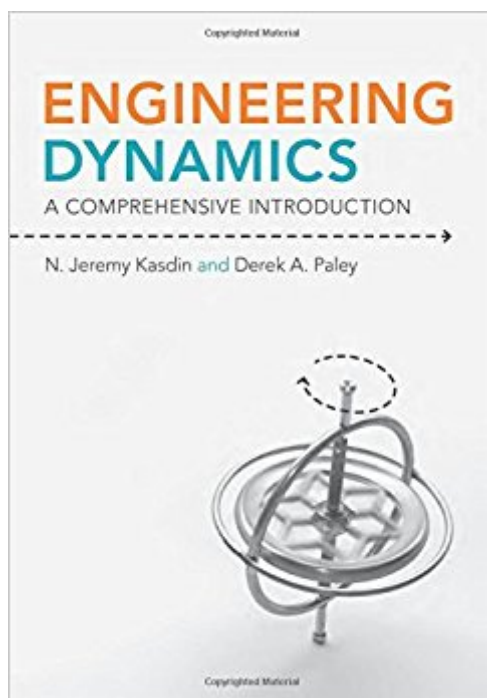


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# Engineering Dynamics: A Comprehensive Introduction



## Synopsis

This textbook introduces undergraduate students to engineering dynamics using an innovative approach that is at once accessible and comprehensive. Combining the strengths of both beginner and advanced dynamics texts, this book has students solving dynamics problems from the very start and gradually guides them from the basics to increasingly more challenging topics without ever sacrificing rigor. Engineering Dynamics spans the full range of mechanics problems, from one-dimensional particle kinematics to three-dimensional rigid-body dynamics, including an introduction to Lagrange's and Kane's methods. It skillfully blends an easy-to-read, conversational style with careful attention to the physics and mathematics of engineering dynamics, and emphasizes the formal systematic notation students need to solve problems correctly and succeed in more advanced courses. This richly illustrated textbook features numerous real-world examples and problems, incorporating a wide range of difficulty; ample use of MATLAB for solving problems; helpful tutorials; suggestions for further reading; and detailed appendixes. Provides an accessible yet rigorous introduction to engineering dynamics Uses an explicit vector-based notation to facilitate understanding Professors: A supplementary Instructor's Manual is available for this book. It is restricted to teachers using the text in courses. For information on how to obtain a copy, refer to: [http://press.princeton.edu/class\\_use/solutions.html](http://press.princeton.edu/class_use/solutions.html)

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## Customer Reviews

"Engineering Dynamics: A Comprehensive Introduction targets students who are taking an

introductory course in dynamics. The authors' stated intent is to provide a clear, rigorous, and complete view of the fundamentals of Newtonian dynamics, emphasizing a deep understanding of the concepts and the mathematics behind them. The result is a book that covers ample topics of engineering dynamics in a structured, detailed, and systematic manner. . . . [The] appendices provide a quick and easy way to review the main concepts and mathematical tools used in solving dynamics problems. . . . Adding to the nice reading, the notation used throughout the book is clearly described. It is consistent and easy to understand; it also promotes a clear identification of the system of reference used. . . . Kasdin and Paley provide a sound mathematical approach in a modern and systematic manner. Engineering Dynamics is an outstanding book that presents an invigorating perspective on one of the most important topics in engineering, proving that, although 'dynamics is difficult,' it is nevertheless extremely important, and, with the right support, one can see that it is also beautiful."--Corina Sandu, Journal of Guidance, Control, and Dynamics

"There are few courses in the engineering curriculum that cause students more difficulty than rigid-body dynamics. By laying out the foundations of the subject with precision and clarity through unambiguous notation and rigorous definitions, Engineering Dynamics goes a long way toward remedying this situation. Numerous examples with motivating applications demonstrate the underlying ideas and solution techniques. This landmark text stands apart in the field, and will be welcomed by students and instructors alike."--Dennis S. Bernstein, University of Michigan

"Kasdin and Paley provide a thorough and rigorous introduction to engineering dynamics. They hit all the required topics, and also present material not normally addressed by an introductory text. This is an ambitious book and the authors carry it out well. It is in many ways better than almost all other comparable texts."--Geoffrey Shiflett, University of Southern California

There are many great books on Engineering Dynamics out there and this book is one of them. However, what really sets this book apart from others is its unique and unorthodox approach in helping students to learn engineering dynamics. This author addresses the 2 most important components in learning this subject - Physics and Mathematics. Each one is treated separately and from the ground up starting with qualitative definition of dynamics concepts followed by basic mechanics with some problem solving at very early stages before delving more in-depth into Newton's laws where their meanings are explained to enable students to realize the advantages and pitfalls in using Newtonian and how they can be complemented by Lagrangian method. Basics like reference frames, velocity and vectors and physics of motions are all consolidated in early

chapters and given the utmost treatments by the author instead of breaking them up as introduction in individual topics. This way, students are able to build a concrete foundation to prepare them for more advanced discussions. Equipped with these basics, students are able to understand that solving problems in motions is about finding equations to predict their trajectories rather than giving those formulations to students without requiring them to understand the underlying principles. The rest of the chapters are very similar to other texts covering particle dynamics, motion of multiparticle system, rigid body dynamics and so on. There's another notable feature which is Tutorial section that acts as chapter summary to remind student once again on the important concepts through various scenarios and by relating to concepts and techniques from other chapters. This book is also a great source for educators who are looking for more effective ways to impart knowledge to students, be it engineering, biology, chemistry or any other sciences. This book can also be a great companion to Fundamentals of Applied Dynamics by James H. Williams, Jr. If only it allows 6-star rating.

The authors have delivered exactly as promised in the preface of this book. You want to read it first! The goals in the preface are set clearly and met without deviation. The issues identified in the preface are very important in the education of classical mechanics for engineers. I read preface, chapters 1 through 3, chapter 8 and skimmed the rest of the book. The language style adopted in this book is simple, directed to the reader, and logically concise. As pointed out in this book, at the very beginning, "The dynamics is difficult". Why? One example is that the dynamics is difficult because the kinematics of bodies embedded in a system and working together in a harmony can easily become very complex to evaluate. The effort needed to solve the governing equations, obtained by use of Newton's laws of motion, is another story. It would be very helpful to adopt the mathematical language (the meaningful use of notations in writing kinematic relations), used in this book, as standard notations by some related non-profit professional institution. Following the mathematical notations, used in this book, is rewarded by obtaining the correct answers in the first attempt when solving any simple or complex problem. Careful use of the notations eases the task of detecting mistakes in the flow of calculations. By reading this book, it would be almost impossible for a student to make fundamental mistakes in solving kinematics of a system that require use of several rotating frames of reference with respect to each other. The authors have definitely identified several student problem areas in comprehending the subject and have highlighted them rightfully. An example is referring to calculation of time derivative of a vector in a rotating frame with respect to another frame as "transport equation". This makes it easy to identify and refer to that computation

whenever needed. Another example is, as the authors call it, "anatomy of Newton's second law" is explained at the very beginning of this book which is the core of the subject in classical mechanics. This is a superb book to be used as the main text in undergraduate course in engineering dynamics and certainly is a very valuable reference for graduate students as well.

The book takes the relatively complex concept of vector dynamics within different frames and cuts it into bite size chunks. I am currently taking Paley's class and he really knows his stuff. He is able to connect to young students who sometimes have trouble wrapping their head around this stuff WITHOUT ever patronizing or getting angry (probably because he is pretty young himself). I would have to say this is my hardest semester in school so far and this book and this class is the hardest, but favorite.

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