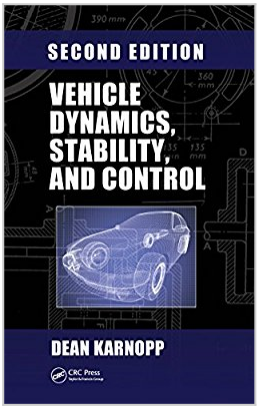


# Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering)

*By Dean Karnopp*



**Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering)** By Dean Karnopp

Anyone who has experience with a car, bicycle, motorcycle, or train knows that the dynamic behavior of different types of vehicles and even different vehicles of the same class varies significantly. For example, stability (or instability) is one of the most intriguing and mysterious aspects of vehicle dynamics. Why do some motorcycles sometimes exhibit a wobble of the front wheel when ridden "no hands" or a dangerous weaving motion at high speed? Why does a trailer suddenly begin to oscillate over several traffic lanes just because its load distribution is different from the usual? Other questions also arise: How do humans control an inherently unstable vehicle such as a bicycle and how could a vehicle be designed or modified with an automatic control system to improve its dynamic properties?

Using mainly linear vehicle dynamic models as well as discussion of nonlinear limiting effects, **Vehicle Dynamics, Stability, and Control, Second Edition** answers these questions and more. It illustrates the application of techniques from kinematics, rigid body dynamics, system dynamics, automatic control, stability theory, and aerodynamics to the study of the dynamic behavior of a number of vehicle types. In addition, it presents specialized topics dealing specifically with vehicle dynamics such as the force generation by pneumatic tires, railway wheels, and wings.

The idea that vehicles can exhibit dangerous behavior for no obvious reason is in itself fascinating. Particularly obvious in racing situations or in speed record attempts, dynamic problems are also ubiquitous in everyday life and are often the

cause of serious accidents. Using relatively simple mathematical models, the book offers a satisfying introduction to the dynamics, stability, and control of vehicles.

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## Editorial Review

Review

As with Prof. Karnopp's other books, a wide range of topics are presented in **Vehicle Dynamics, Stability, and Control**. If one enjoys Prof. Karnopp's other textbooks, as I do, then this textbook is another wonderful adventure through a complicated and interesting technical subject.
?Robert M. Sexton, Virginia Commonwealth University

I will consider adopting this book for my vehicle dynamics course. The modeling is a step above the book currently used and should improve the students' understanding of the subject matter. The material on active control of vehicles is a good addition.
?Jack E. Helms, Louisiana State University

The material is written in a very direct way. Reading it goes on smoothly to the end without trouble. And when you have finished, you happily have understood a very complicated issue. … I do think Prof. Karnopp is one of the very best professors in Mechanical Engineering living today. The book can be recommended both to beginners and to experienced scientists or engineers. Beginners will take advantage from the very easy way the complicated topics are presented and made easy to grasp. Experienced scientists can get further insight into basic phenomena presented with unsurpassed inspiring style.
?G. Mastinu, Politecnico di Milano

The book includes a rich compilation of examples of the application of basic methods of stability analysis to vehicle dynamics behavior, both attractive to the lecturer and students. It brings two subjects ? stability of motion and vehicle dynamics, which are often lectured separately ? together and reveals the benefit of an integrative view. … The book offers a very attractive introduction to the analysis of stability of motion from a comprehensive vehicle dynamics point of view. Examples include automobiles, aircrafts, railway vehicles, vehicle dynamics control etc., which give engineering students an easy understanding of the application of mathematical methods to illustrative problems on the dynamic behaviour of vehicles. Basic models on the external force generation at tires, railway wheels, or wings are presented as well and allow for a more comprehensive understanding of vehicle dynamics.
?Manfred Plöchl, Vienna University of Technology

The chapters provide good and wide basic knowledge in the field of vehicle stability. The book is focused on analogies between several technical fields, which – in my mind – gives a good understanding of the physical effects behind. It is easy to read and to understand, since it uses simple words and refers to daily-life-examples. As explicitly mentioned by the author, it is not aimed at explaining the physics deeply. The focus is giving an overview and providing a fundamental and solid base of knowledge. In my opinion, this is achieved successfully. I would recommend this book to students or engineers who are interested in getting a good overview with respect to vehicle stability and in understanding how various physical effects are connected with each other.
?Dr. Andreas Wagner, Manager Vehicle Attributes of Chassis Concepts, Audi, Ingolstadt, Germany

**Praise for the First Edition:**
...a comprehensive analysis of the vibration characteristic parameter which defines stability. The author widely use[s] mathematical reasoning to establish the optimum ways to improve vehicle stability. ... The

book is a valuable reference ... it is very useful for professors, researchers, and students interested in the vehicle stability field.
?Prof. Dan Dascalescu, Ph.D.

The monograph will be useful for students and engineers specializing in the related fields.
?*Zentralblatt MATH*

## Users Review

**From reader reviews:**

**Matthew Coleman:**

Spent a free the perfect time to be fun activity to accomplish! A lot of people spent their down time with their family, or their friends. Usually they carrying out activity like watching television, likely to beach, or picnic from the park. They actually doing same task every week. Do you feel it? Do you need to something different to fill your free time/ holiday? Can be reading a book can be option to fill your no cost time/ holiday. The first thing that you'll ask may be what kinds of guide that you should read. If you want to try look for book, may be the publication untitled Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering) can be good book to read. May be it may be best activity to you.

**Jim Moffett:**

The actual book Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering) has a lot of knowledge on it. So when you read this book you can get a lot of profit. The book was published by the very famous author. The writer makes some research prior to write this book. That book very easy to read you will get the point easily after perusing this book.

**Nancy Jackson:**

Are you kind of occupied person, only have 10 as well as 15 minute in your day to upgrading your mind proficiency or thinking skill possibly analytical thinking? Then you are experiencing problem with the book compared to can satisfy your limited time to read it because this all time you only find guide that need more time to be read. Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering) can be your answer because it can be read by an individual who have those short spare time problems.

**Mark Brainerd:**

As we know that book is significant thing to add our understanding for everything. By a reserve we can know everything we really wish for. A book is a list of written, printed, illustrated or even blank sheet. Every year ended up being exactly added. This guide Vehicle Dynamics, Stability, and Control, Second Edition (Mechanical Engineering) was filled concerning science. Spend your time to add your knowledge about your scientific disciplines competence. Some people has various feel when they reading any book. If you know how big selling point of a book, you can experience enjoy to read a e-book. In the modern era like today, many ways to get book that you simply wanted.

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