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Gang Sheng
(Gang Sheng Chen)

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Preface

The last decade has been characterized by the remarkable development of many technical and scientific domains, and the development of vibration and sound technology of road vehicles has been on this same trajectory. The new generation of road vehicles is very different from the previous generation. Modern vehicles have new rules for features of vibration and sound beyond the conventional requirements simply for vibration and noise control. This book is intended to enable its readers to make engineering advances in this area.

This is a textbook intended for upper-level undergraduate and graduate students in automotive engineering as an independent study text and for practicing engineers, designers, researchers, and educators to use as a reference book.

In the past decades, educators, researchers, and practitioners have devoted considerable effort toward researching vibration and sound in vehicles. Many papers have been published, but very little information on this topic can be found in existing books. Some previously published books or book chapters contain relevant material that emphasizes particular systems. However, some important applications and a number of recent developments have not been included. There has been the lack of a book to integrate the principles and analysis approaches as well as test techniques to provide a means for mastering all of the concepts of vehicle vibration and sound, to give a big picture and framework on the topic to readers. This book is a contribution toward these efforts and aims to fill the void.

This book is based on my experiences as a researcher and teacher of sound and vibration problems in road vehicles, and on my experiences with developing and offering short courses in this area. I was once fortunate to serve as an advisory scientist and consultant in California and a research scientist in Michigan, USA from 2001–2008. I hope that I have contributed a few, practically realizable solutions. In the course of my work I have learned much from the practitioners of the art with respect to making the vehicle behave both acceptably and pleasurably from a sound and vibration standpoint.

The objective of the book is to give readers a working knowledge of vehicle vibration and sound, enabling them to analyze vehicle vibration and sound parameters ranging from vibration reduction, noise control, and sound quality design. In the book, equal emphasis is given to theory and practical application. The principles, analytical formulations, design approaches, and testing techniques are presented and illustrated. The balance covers the different levels from vehicle, to system, to key components.