

# Vibration Causes & Cures

By Jie Pan & Brian J. Stone

# CONTENTS

Each chapter is a separate pdf file and can be quite large (1.5 MB). There are links to animation programs from within the chapters. A [list of the programs](#) is available with links to run the programs.

[Introduction](#): This discusses the importance of vibration and introduces the animation programs, equilibrium position and degrees-of-freedom.

[Chapter 1](#): One degree-of-freedom vibration.

This covers simple vibration theory and introduces many of the terms and concepts that are used in more complex vibration situations

[Appendices](#): Newton's second law; Free body diagrams; Gravity effects; Phase.

[Chapter 2](#): Two degree-of-freedom vibration.

This extends vibration theory and introduces the concepts of modes of vibration and illustrates some methods for reducing vibration.

[Chapter 3](#): Beam on springs

This is another example of a two degree-of-freedom system that includes rotation as well as translation. Together with the axial system considered in chapter 2 it provides useful illustrations for the next chapter.

[Chapter 4](#): Analysis methods

A variety of methods that are used for finding natural frequencies and mode shapes is presented.

[Chapter 5](#): Multi degree-of-freedom vibration.

The analysis of systems with increasing numbers of degrees-of-freedom is presented.

[Chapter 6](#): Modal analysis.

The use of modal characteristics to find transient and steady state solutions.

[Chapter 7](#): Continuous systems

The axial and torsional vibration of beams is presented.

[Chapter 8](#): Continuous systems

The transverse vibration of beams is presented.

[Chapter 9](#): Receptances - a systems approach

The systems approach is useful in gaining understanding and finding solutions. It allows a building block approach to generate complex systems.

[Conclusions](#):

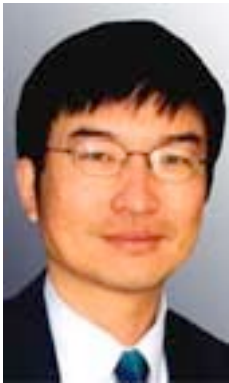
[List of programs](#):

## **ABOUT THE AUTHORS**



Professor Stone was appointed to a Chair in Mechanical Engineering at the University of Western Australia in 1981. He has won many prizes for teaching. His research interests are in the area of reducing vibration in production processes (most notably chatter in machining processes) and in using computers to aid teaching.

He has a doctorate (PhD) and a higher doctorate (DEng) from the University of Bristol.



Professor Pan is director of the centre for acoustics, dynamics and vibration in the School of Mechanical Engineering, the University of Western Australia. His area of teaching includes vibration, acoustical engineering, control and mechatronics. His research interests are room acoustics, structural acoustics and active noise and vibration control.

He has a doctorate (PhD) from the University of Adelaide.