



# Resonance: Applications in Physical Science

*Michael M Woolfson*

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# Resonance: Applications in Physical Science

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## **Resonance: Applications in Physical Science** Michael M Woolfson

This book explores a large number of resonance effects that occur both in everyday life and in scientific contexts. It is a topic that provides a cross-link between many branches of science and shows how a single scientific principle can manifest itself in many, apparently disparate, ways.

*Resonance* covers fields as diverse as civil engineering in relation to the safety of bridges, the quality of sound from musical instruments, the behaviour of electrical circuits, lasers, the orbits of solar-system bodies, the scattering of X-rays from atoms and the exploration of the structures of molecules, atoms and nuclei.

The essential mathematics included should be accessible to any science undergraduate, no matter the discipline of their study. Problems and solutions are provided for every chapter to help reinforce understanding of the material.

FORTTRAN code (6 KB)

### **Contents:**

- Introduction
- Simple Harmonic Motion, Damping and Resonance
- Resonance in Everyday Life
- Electrical Circuits and Resonance
- Resonance in the Solar System
- Nuclear Magnetic Resonance
- Electron Spin Resonance
- Resonance with Electromagnetic Radiation
- Nuclear Physics, Radiation and Particle Physics
- The Mössbauer Effect
- Appendix I: The Binomial Theorem and Approximations
- Appendix II: A Program for Simulating Kirkwood Gap Formation
- Appendix III: A Program for Finding the Orbits of Trojan Asteroids
- Physical Constants and Useful Data
- Solutions to Examples and Problems
- Index

**Readership:** Undergraduate students studying physics, especially in the fields of physical optics or electron-spin resonance.

### **Key Features:**

- It shows how a single scientific principle can describe phenomena as diverse as a child playing on a swing and confirmation of a result coming from Einstein's General Theory of Relativity
- The essential mathematics is clearly given and should be accessible to any science undergraduate, no matter what the discipline of his or her study
- There are examples within the text and problems at the end of each chapter, with provided solutions that will enable a student to reinforce understanding of the material

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