



## Resonant Ultrasound Spectroscopy: Applications to Physics, Materials Measurements, and Nondestructive Evaluation

By Albert Migliori, John L. Sarrao

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## **Resonant Ultrasound Spectroscopy: Applications to Physics, Materials Measurements, and Nondestructive Evaluation** By Albert Migliori, John L. Sarrao Bibliography

- Sales Rank: #3884748 in Books
- Published on: 1997-08-14
- Original language: English
- Number of items: 1
- Dimensions: 9.53" h x .75" w x 6.42" l, 1.10 pounds
- Binding: Hardcover
- 202 pages

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### **Editorial Review**

From the Publisher

This first procedural guide to RUS, Resonant Ultrasound Spectroscopy offers a clear step-by-step tutorial, from developing a preliminary set of resonances to final determination of moduli. The book also contains intermediate computer outputs showing where mistakes are made, how to spot them, and how to remeasure to correct problems. Also a complete reference to the language of RUS, this book is full of clear explanations of every variable, concept, and hard-to-find term currently in use.

From the Back Cover

The first authoritative handbook on Resonant Ultrasound Spectroscopy

Resonant ultrasound spectroscopy (RUS) is one of the most versatile modulus measurement and nondestructive evaluation techniques available. It is applicable to a wide variety of materials, from high-temperature superconductors and stabilized ceramics to sintered alloys and new electronic materials. The first procedural guide to RUS, Resonant Ultrasound Spectroscopy offers a clear step-by-step tutorial, from developing a preliminary set of resonances to final determination of moduli. The book also contains intermediate computer outputs showing where mistakes are made, how to spot them, and how to remeasure to correct problems. Also a complete reference to the language of RUS, this book is full of clear explanations of every variable, concept, and hard-to-find term currently in use. In addition, the book provides an introduction to mechanical resonances and relevant aspects of information theory as well as the first complete description of how RUS is used as a nondestructive evaluation (NDE) tool, including what qualities of a resonance measurement can be used to select flawed parts.

Other features include:

- \* Procedures for making precision resonance frequency measurements on small solid samples
- \* Procedures for analyzing those resonances to obtain elastic moduli, including the moduli of anisotropic materials
- \* Successful examples of RUS in phase transitions, ultrasonic attenuation, geology, and equations of state that will enable readers to apply RUS to their own measurement problems
- \* Measurements relating to RUS and to ultrasonics and physics for use in frequency/time-of-flight measurements
- \* Lagrangian minimization techniques that will enable the reader to create his or her own code

Designed to enable readers to construct or purchase a complete measurement system and use it for modulus measurements or NDE, the book includes step-by-step procedures for the reduction of data as well as a complete mathematical description of analysis algorithms and examples. Full of material unavailable elsewhere, including an entertaining history of RUS, Resonant Ultrasound Spectroscopy is a unique comprehensive stand-alone reference and an essential user's manual to understanding and making optimal use of this technique.

About the Author

ALBERT MIGLIORI is currently a fellow of the Los Alamos National Laboratory and a leading expert in the use of resonant ultrasound spectroscopy as a solid-state physics tool. JOHN L. SARRAO is a researcher with the Condensed Matter Group of the National High Magnetic Field Laboratory at Florida State University.

## **Users Review**

### **From reader reviews:**

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