

## **AME/CE/EM 606: Elastic Wave Propagation in Solids**

**Class Hour:** T-Th 3:30-4:45

**Room:** Haury Anthro Bldg, Room 219

**Office Hour:** Tu-Th 2:00-3:15

**Instructor:** T. Kundu (tkundu@email.arizona.edu), Office: CE 324D, Phone 520-621-6573.

### **Grading Policy:**

Home Work	30%
Mid Term Exam	30%
Final Exam - Wednesday, May 9 (3:30 to 5:30 pm)	40%

### **Textbook:**

*Ultrasonic and Electromagnetic NDE for Structure and Material Characterization - Engineering and Biomedical Applications, Ed. T. Kundu, Pub. CRC Press, Taylor and Francis, Boca Raton, FL, USA, ISBN 978-1-4398-3663-7, 2012*

(this textbook will be closely followed)

or

*Ultrasonic Nondestructive Evaluation: Engineering and Biological Material Characterization, Ed. T. Kundu, Pub. CRC Press*

### **Syllabus**

Background Materials: Fundamentals of the Theory of Elasticity / Continuum Mechanics  
Traction-Stress Relation, Equilibrium Equations, Stress & Strain Transformation, Stress-Strain Relation for Isotropic Materials, Navier's Equation of Equilibrium, Fundamental Equations of Elasticity in Different Coordinate Systems

#### New Materials:

One-Dimensional Dynamic Problems

Stokes-Helmholtz Decomposition

Two-Dimensional Problems – P wave and S wave

Interaction between Plane Waves and Stress-Free Plane Boundary

Out-of-Plane or Anti-Plane Problems – SH Wave

Interaction of P and SV Waves with Plane Interface

Rayleigh Wave in a Homogeneous Half Space

Love Wave

Anti-plane Waves in a Plate – Anti-plane Plate Wave

In-plane Waves in a Plate - Lamb Waves

Phase Velocity and Group Velocity

Wave Propagation in Fluids

Relation between Pressure and Velocity, Reflection and Transmission of Plane

Waves at the Fluid-Fluid Interface, Plane Wave Potential in a Fluid

Reflection and Transmission of Plane Waves at a Fluid-Solid Interface

Reflection and Transmission of Plane Waves by a solid plate immersed in a fluid  
Rayleigh Wave in a Layered Half Space  
Modeling of Wave Propagation Problems – Distributed Point Source Method (DPSM)

Applications: Ultrasonic Nondestructive Testing and Evaluation (NDT&E)