WAVE PROPAGATION IN SOLIDS

Instructors: H.G. Georgiadis, P.A. Gourgiotis, Th. Zisis
Class:
Office Hours:

Textbook: NO Textbook

Recommended Reading:

J.D. Achenbach, Wave Propagation in Elastic Solids, Elsevier 1975.
K.F. Graff, Wave Motion in Elastic Solids, Dover Publications 1975.
J. Miklowitz, Elastic Waves and Waveguides, North-Holland Publishing 1978.
L.B. Freund, Dynamic Fracture Mechanics. Cambridge University Press 1989.
V.B. Poruchikov, Methods of the Classical Theory of Elastodynamics, Springer 1993.
J.G. Harris, Linear Elastic Waves, Cambridge University Press 2004.

<u>CONTENTS</u>

1) Introduction, wave equation, wave speed, D' Alembert solution, particle velocity,
2) Method of characteristics, longitudinal and torsional waves in 1-D.
3) Navier's equations of motion, boundary- and initial-value problems.
4) Radiation conditions, wave packets, group velocity.
5) Three-dimensional waves, Helmholtz decomposition, Lame potentials, dilatational and shear waves.
6) General theorems: Poisson's representation, Neumann uniqueness theorem, reciprocal theorem.
7) Plane waves, harmonic waves, slowness diagrams.
8) Reflection and transmission of P, SV, SH waves across interfaces, continuity conditions, Snell's law, Reflection and refraction at interfaces.
9) Half-space problems, Rayleigh waves, Stoneley waves.
10) Suddenly applied uniform normal pressure, Lamb problem, Cagniard-deHoop method, buried load problems.
11) Scattering of waves from cracks.
12) Problems of moving loads and moving cracks.
13) Waveguides, 1-d waves, dispersion, cut-off frequency, 2-d waves, thin plates, Lamb waves, Love waves, Rods, Pochammer-Chree equation.
14) Waves in anisotropic media.