

MIE1709HF - Continuum Mechanics

Continuum Mechanics is the study of the response of the matter on a macroscopic scale to different loading conditions, neglecting the structure of the matter on the smaller scale (i.e., molecular scale). It brings out the general principles common to all media and discusses the assumptions for developing constitutive equations of idealized materials (e.g., solid and fluid). The developed fundamentals can be applied to engineering problems such as elasticity, viscoelasticity, plasticity, linearly viscous fluid, etc.

In this course, mathematical foundations of continuum mechanics will be taught. Next, the topics of kinematics of a continuum, conservation laws, stress, material models and constitutive equations, finite deformation of elastic body with applications, finite deformation thermo-elasticity, dissipative media (e.g., Newtonian viscous fluid, Viscoelastic medium, simple shear problem) will be covered. The concepts are illustrated through the solution of tractable initial-boundary-value problems.

Reference Book

“Introduction to Continuum Mechanics,” 4th Edition, by W Michael Lai, David Rubin, and Erhard Krempf, published by Elsevier (ISBN: 978-0-7506-8560-3)