Continuum mechanics (5op)

fall 2022

Lectures Tuesday 10.15-12 lecture hall RH215, lecturer Reijo Kouhia, office RM216, tel 040 8490561, e-mail: `reijo.kouhia@tuni.fi`

Exercises: Thursday 12.15-14 lecture hall RH215, guided by Shinya Abe.

Goal: Give introduction to the balance equations of continuum mechanics, descriptions of motion and the basics to formulate thermodynamically consistent constitutive equations.

Literature: E.B. Tadmor, R.E. Miller, R.S. Elliot: *Continuum mechanics and thermodynamics - From fundamental concepts to governing equations*, Cambridge University Press, 2012.
Other good books: G. Holzapfel: *Nonlinear solid mechanics. A continuum approach for engineering*, John Wiley & sons, 2000.
L.E. Malwern: *Introduction to the mechanics of a continuous medium*, Pretice-Hall, 1969.

Requirements: Homeworks

Information: POP + course homepage <http://webpages.tuni.fi/rakmek/?id=18>

Time table

Lecture 1, week 35, 30.8. Mathematical basis. Cartesian tensors.

Lecture 2, week 36, 6.9. Differentiation, integration.

Lecture at week 37 cancelled

Lecture 3, week 38, 20.9. Kinematics. Different descriptions for motion.

Lecture 4, week 39, 27.9. Deformation gradient and other strain measures. Lie derivative.

Lecture 5, week 40, 4.10. Stress measures.

Lecture 6, week 41, 11.10. Balance principles.

Lecture 7, week 43, 25.10. Balance principles.

Lecture 8, week 44, 1.11. Objectivity.

Lecture 9, week 45, 8.11. Hyperelastic material models.

Lecture 10, week 46, 15.11. Hyperelastic material models.

Lecture 11, week 47, 22.11. Continuum thermodynamics for materials modelling.

Lecture 12, week 48, 29.11. Variational principles.