TECHNISCHE UNIVERSITÄT BERLIN

Fakultät V – Verkehrs- und Maschinensysteme - Institut für Mechanik

FG Systemdynamik
und Reibungsphysik

Prof. Dr. Ivan Argatov
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Lehrveranstaltungsankündigung SoSe 2020

3537 L 012 6 ECTS LP (2VL+2UE)

Indentation Testing of Biological Tissues

Dienstag: 10 - 12 Uhr, **Beginn:** wird per Email geteilt (voraussichtl. 21.04.2020)
Mittwoch: 08 - 10 Uhr,

Course Goals

The course develops a mathematical modeling approach to capture the indentation phenomena in biomedical materials and applies this to the analysis of dynamic and impact deformation of biological tissues. Basic knowledge and skills to develop the design of indentation testing techniques for viability identification of living tissues and biological materials.

Prerequisites

a) Obligatory: knowledge of mechanics and higher mathematics, possession of basic knowledge of mathematical models of physical phenomena (solid mechanics, viscoelasticity)
b) Desirable: elements of mathematical physics and analytical methods

Content

Elastic and viscoelastic materials; Biphasic material; Confined and unconfined compression tests; Frictionless flat-ended and spherical indentation; Thickness effect in indentation; Indentation of relatively thin elastic layers; Rebound indentation test; Dynamic indentation test; Vibration indentation test; Fung's quasi-linear viscoelastic model; Impact testing and Hunt–Crossley model; Multi-scale indentation testing.

Literature

1. Argatov, I., Mishuris, G., 2018. Indentation testing of biological materials. Springer, Cham.
2. Argatov, I., Mishuris, G., 2015. Contact Mechanics of Articular Cartilage Layers: Asymptotic Models. Springer, Cham, Switzerland.
3. Popov, V.L., 2010. Contact Mechanics and Friction. Springer, Berlin.
4. Johnson, K.L., 1985. Contact Mechanics. Cambridge Univ. Press, Cambridge.
5. Fischer-Cripps, A.C., 2002. Nanoindentation. Springer, New York.
6. Fung, C., 1993. Biomechanics: Mechanical Properties of Living Tissues. Springer, New York.