MECHANICAL ENGINEERING STUDENT SEMINAR

Thursday, January 19 2023 at 13:00, D. Dan and Betty Kahn Building, Auditorium 1.
Online**:** https://technion.zoom.us/j/95893133367

Identifiability of soft-tissue constitutive parameters from in-vivo indentation and inverse finite element analysis

Zohar Oddes

Adviser: Asst. Prof. Dana Solav

Soft biological tissues (e.g. skin, muscle, adipose, and other connective tissues) exhibit a broad range of characteristic mechanical behaviors, such as nonlinear, anisotropic, and strain-rate dependent responses, which are attributed to their distinct biological microstructures. Accordingly, the bulk mechanical response of the soft tissue complex to external loads exhibits similar traits and is fundamentally specific to both the anatomical region and the individual. Consequently, many applications in which the mechanical response of the soft tissue plays a major role (e.g., surgical planning, disease diagnosis, and design of medical devices) must account for this inter- and intra-subject variability in the soft tissue.

In this research we address one of the greatest challenges we currently face when simulating a biomechanical problem that includes soft tissues – obtaining a reliable numerical model which manages to capture the unique and complex mechanical response of an individual's soft tissue.

In this talk, I will first explain how the constitutive parameters can be identified *in-vivo* by using a noninvasive indentation test as an alternative approach to standard mechanical tests, which require a dedicated test specimen. Then, I will present the numerical framework we designed to explore what affects the identifiability of each material parameter from commonly used constitutive laws for soft-tissue mechanics. Finally, informed by the results of our analysis, we will present and discuss improved identification strategies that can be implemented in order to achieve higher fidelity numerical models of soft-tissue mechanics.

Note: the seminar will be given in English

Solav Biomechanical Interfaces Group

Seminars Coordinator: Assoc. Prof. Matthew Suss.