

סמינריון

הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 11.01.2021
(כז' בטבת, תשפ"א), בשעה 14:30 באמצעות הזום :

<https://technion.zoom.us/j/6537328956>

מרצה : פיטר ברייטמן

מנחה : פרופ' ח' אמיר גת

על הנושא :

Fluid mechanics of soft robots – Effects of fluid compressibility and elastic multi-stability

The seminar will be given in Hebrew

תקציר ההרצאה :

The seminar will present my PhD research on fluid driven actuation of elastic structures. The seminar is comprised of two parts:

The first part will talk about pneumatics of soft robots. Pressurization of gas within embedded channels and cavities is a popular method for actuating soft robots. In this work we derive a general model for compressible viscous flow in an elastic media representing a simplified miniaturized soft robot. We illustrate applying this model to periodic configurations, simplifying it via a long-wave approximation. Steady and time-dependent solutions are obtained, allowing to model the flow and to provide insight into the actuation dynamics of miniaturized pneumatic soft robots.

The second part will talk about flow in straws. There is considerable interest in the study of 1D lattices of bi-stable elements for the creation of meta-solids. In this work we examine interaction of viscous flow with such lattices. We focus on the case of the common straw, which is composed from multiple frusta - conical bi-stable elastic elements. We model the flow inside the straw by implementing the lubrication assumption, and use classic solutions for conical springs to construct an approximated tri-linear constitutive law for the chain of frusta. We solve the extension dynamics of a single frustum analytically for the case of slow gradual loading, and apply long-wave approximation to obtain a continuous solution. Finally, we verify our findings with experiment. Authors believe that understanding the mechanical principles governing chains of frusta may be highly applicable for shock absorber and actuator design, specifically for soft robots.

בברכה,

פיליפ אית' סאס
מרכז הסמינרים