סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 21.10.21 (ט"ו בחשוון, תשפ"ב), בשעה 13:30 באמצעות הזום : https://technion.zoom.us/j/3635745706

מרצה : יוסי דיין

מנחים : פרופ'/ח ספי גבלי ופרופ' אמר' דוד דורבן

על הנושא:

Post-contact behavior of a compressed fiber inside a tube: experimental and theoretical investigation

The seminar will be given in Hebrew

תקציר ההרצאה :

We study the post-buckling behavior of a clamped-clamped elastic fiber constrained inside a cylindrical tube, a problem of practical importance in a wide range of medical and engineering applications. The study includes two main parts. The first considers the case of a rigid constraining tube, where focus is placed on characterizing the evolution of contact between the fiber and the cylinder wall. The main experimental challenge is to identify segments of contact and distinguish them from portions of the fiber that are very close to the cylinder wall but make no contact with it. To this end, we employ a novel experimental setup consisting of a transparent rigid cylinder filled with an opaque fluid, combined with image processing and synchronized force measurements. In the second part, we consider the case of a deformable constraining tube. Here, the interaction force (contact) between the fiber and the tube leads to deformation of the tube and therefore to a two-way coupling between them. Similar to the first part, the investigation involves a combination of experiments, finite-element analysis, and a simple analytical model. The results of all methods are in very good agreement, and provide valuable information related to the fiber deformation and to the evolution of contact between the fiber and the tube. The results also highlight the fact that the behavior of a compressed fiber that is constrained by a deformable tube significantly deviates from that of a fiber constrained inside a rigid cylinder. Lastly, we present quantitative insights regarding the influence of relevant parameters on the behavior of such systems that may have practical use in applications such as stent procedures, medical endoscopy, deep drilling, and the mechanics governing the growth of filopodia in living cells.

בברכה,

פרופ"ח אתי סאס

מרכז הסמינרים