

סמינר - SEMINAR

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 09.08.2021 (א' באלול תשפ"א), בשעה 14:30. הסמינר יועבר באמצעות הזום, דרך [הקישור הזה](#).

מרצה:

Dr. Ron Schnapp,

Prof. Victor Steinberg

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על הנושא:

Elastic Instability and Elastic Waves in a Weakly Perturbed Viscoelastic Channel Flow

The seminar will be delivered in English

להלן תקציר ההרצאה:

Dissolving a minute amount of long polymer chains in a Newtonian solvent turns it into a viscoelastic fluid and makes its constitutive equations non-linear. Thus, even in the limit of vanishing Reynolds number, such fluids are prone to instabilities and a chaotic flow state called elastic turbulence [1, 2]. Surprisingly, although a linearized theory for straight shear flows of such fluids predicts their stability, more recent analyses suggest that these flows could be unstable and exhibit elastic turbulence following sufficiently strong initial disturbances [3]. In this talk, we shall inspect the sensitivity of a viscoelastic fluid channel flow (plane Poiseuille flow) to a weak initial disturbance experimentally. We shall review recent results from our study and see that significant fluctuations, instability, and an intriguing type of waves can develop in this flow following only a weak disturbance to the flow [4]. In addition, we shall characterize the observed waves and confirm their dispersion relation. Interestingly, this instability is in analogy to the transition to turbulence in channel flows of Newtonian fluids at high Reynolds numbers since this transition too occurs despite the linear stability of the base flow. Thus, these results extend our understanding of low Reynolds number viscoelastic fluid flows, showing that special attention is needed when attempting to model or predict their behavior..

[1] R. G. Larson. *Rheol. Acta.*, 31(3), 1992.

[2] V. Steinberg. *Annu. Rev. Fluid Mech.*, 53(1), 2021.

[3] L. Pan, A. Morozov, C. Wagner, and P. E. Arratia. *Phys. Rev. Lett.*, 110, 2013.

[4] R. Schnapp, and V. Steinberg. arXiv:2106.01817, 2021 (under review).

מארז: פרופ' אולג גנדלמן

בברכה,

רנן שנייב

מרכז הסמינרים