סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 18.02.21

(ו׳ באדר, תשפ״א), בשעה 13:45 באמצעות הזום :

https://technion.zoom.us/j/99866781551

מרצה : אלעד שטרמן-כהן.

מנחה : פרופ׳ אלכסנדר אורון.

על הנושא:

Stability of Thin Liquid Layers Under Vibrating Forcing

The seminar will be given in Hebrew

תקציר ההרצאה :

Interfacial instabilities develop in a liquid-liquid or liquid-gas interface, due to a growth of interfacial perturbations. These instabilities may be capillary, electrohydrodynamic, magnetic and others. Analysis of flow dynamics with interfacial instability is a fascinating challenge which has been drawing the attention of many researchers from all around the world for more than a century.

Rayleigh-Taylor instability is one of the classic instabilities that has drawn attention for many years. In its general form, this instability arises in system that consists of two fluid layers with different densities, where the heavier fluid is being accelerated into the lighter one. This instability can be found in various scientific fields such as: astrophysics, ballistics, coatings, polymers, rain drops dynamics, flow in small systems in the context of lab-on-a-chip and many more.

This research focuses on linear and nonlinear analysis of the flow dynamics of thin liquid layers under vibrating forcing. The investigated configuration in its most general form consists of a thin liquid film under a rigid substrate in the gravity field, where the gas layer under the liquid film is supported by another rigid substrate. The substrates may be kept at different temperatures.

The main goal of the research is to investigate methods to stabilize or saturate Rayleigh-Taylor instability in thin liquid films, such as applying vibrational and thermal conditions on the substrate attached to the liquid film. The main tool used in the research is a nondimensional reduced model based on the long-wave-theory and on the weighted residual approach. The leading idea is to transport liquid from the thick regions of the liquid films to the thinner ones, and thus to prevent the local thickness of the film to decrease to zero. Applying vibrating forcing on the substrate enables this mechanism to operate cyclically, and thus it saturates the instability. Applying temperature gradient between the substrates results in heat transfer through the fluid layers and Marangoni flow, which acts to attenuate Rayleigh-Taylor instability or enhance it, depending on the heat transfer direction.

בברכה,

פרופ״ח מתי סאס

מרכז הסמינרים