Technion-Israel Institute of Technology
Faculty of Mechanical Engineering

הטכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד׳ 30.01.2019 (כד׳ בשבט, תשע״ט), בניין דן קאהן, אודיטוריום 1, 13:30.

מרצה: מרק דוידזון

מנחה: פרופ׳/ח טל כרמון

על הנושא:

Light and Capillary Waves Propagation in Water Fibers and Tunable Tweezer controlled Microresonators

The seminar will be given in English

תקציר ההרצאה :

The confinement of light and sound, while they are traveling in fibers, enables a variety of light-matter interactions. Therefore, it is natural to ask if fibers can also host capillary waves. Capillary waves are similar to those we see when throwing a stone into a puddle. Such capillary waves are prohibited in microfluidic devices where the liquid is bounded by solid walls. In contrast, we have fabricated fibers, which are made entirely from water and are suspended in air. The water fiber can therefore move, e.g. in a resonant mode that reassembles the motion of a guitar string. In our experiment, light guided through the water fiber allows optical interrogation of is capillary oscillations. Co-confining two important oscillations in nature: capillary and electromagnetic, might allow a new type of devices called Micro-Electro-Capillary-Systems [MECS]. The softness of MECS is a million times higher when compared to what the current solid-based technology permits, which accordingly improves MECS response to minute forces such as small changes in acceleration. Additionally, MECS might allow new ways to optically interrogate viscosity and surface tension, as well as their changes caused by introducing an analyte into the system.

Optical traps serve in the most sensitive biological-force measurements as well as in chemistry and physics research. As optical tweezers can trap almost perfectly spherical droplets while precisely controlling their position, here we can activate tweezed droplets as optical micro-resonators. By doing so, one can benefit from modern tweezing techniques such as dynamical holograms that can simultaneously manipulate multiple particles. We utilize optical tweezers to shape and deform microdroplets into elliptical, triangular and rectangular shapes while light resonates inside. Doing so, allow us to tune the optical as well as the capillary resonance frequency and quality factor. Our long-term vision includes optical circuits where a multi-minima optical trap shapes and positions multiple optical components.

בברכה,

פרופ"א מתי סאס
מרכז הסמינרים