סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד' 24.11.21
(כ' בכסלו, תשפ"ב), בשעה 13:30 באודיטוריום 1, קומה 0, בניין דן-קאהן.

מרצה: שמעיה עמית

מנחה: פרופ' איל זוסמן

על הנושא:

Adaptable canopy-like structure for underwater sensing

The seminar will be given in Hebrew

תקציר ההרצאה:

Unexploded marine ordnances, or smuggled drugs packages, whether floating or submerged, represent a significant technological challenge with major implications for the environment and security. Although electromagnetic, magnetic, and image sensors have been developed, they tend to perform poorly due to uncertainties in the materials composition, the geometry of suspect objects, and the harsh marine environment.

This work is premised on the idea that the exteriors of these objects are highly susceptible to contamination from explosive residues or other molecules of interest. In order to probe these objects, we propose an adaptable canopy that conforms to the suspected surface by applying pressure, through which the sampled region is isolated from the bulk of the water. A gel with a reagent is injected onto the surface, producing a colorimetric chemical reaction. Among the main challenges are violent water flow and salinity interfering with the reaction, and dilution of reagents in bulk water.

Under open channel flow, the flow around a submerged canopy-like structure was numerically studied. By adjusting the density, dimensions, and vertical displacement of the pillars, we can modulate the porosity of the canopy, thereby controlling the flow regime within. The underwater detection gel was designed to wet the surface and remain chemically and mechanically stable during injection by optimizing its viscosity and chemical composition.

An end effector with flexible silicone pillars and an injection system within it was developed to demonstrate underwater sensing. A series of experiments conducted in saline water and on different surfaces under different flow regimes (at 0.1-0.35 m/s) confirmed the simulation results.

בברכה,

פפוס