

## סמינריון

הנדך מוזמנת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 18.10.2018 (ט' בחשוון, תשע"ט), בניין דן קאהן, אודיטוריום 1, 13:30.

**מרצה:** נעם מורגנשטרן

**מנחה:** פרופ' שאול גוטמן

**על הנושא:**

# Endo-Atmospheric Vector Guidance

The seminar will be given in English

## **תקציר ההרצאה:**

In the field of guided projectiles, the purpose of the guidance system is to minimize the miss distance at the terminal moment of flight. We consider the case of an endo-atmospheric guided projectile intended to hit a stationary target. In such a system, there is a relative acceleration between the projectile and the target; firstly, the acceleration of gravity acts on the projectile, but not on the stationary target; secondly, the projectile experiences aerodynamic drag, which decelerates it. These combined accelerations must be overcome by the guidance system, in addition to the miss distance which would result from initial relative location and velocity.

In order to overcome the above problems, several solutions have been proposed and implemented. The simplest involve the use of traditional exo-atmospheric guidance, e.g. Proportional Navigation, with control acceleration powerful enough to compensate for the constant environmental accelerations. These powerful control accelerations however come at cost; large power-hungry control surfaces and draggy wings are needed.

Another solution to the problem which is currently used is a predictor-corrector system. In this system, the path of the projectile until impact is mathematically simulated to find the predicted impact point. The location of this point relative to the target is used to decide the control command, based on ad-hoc logic. This system allows the use of smaller control forces, as it accounts for future constant accelerations, but it cannot guarantee convergence and is computationally intensive, with all the costs associated with that.

To solve the problem without the disadvantages of the current solutions, a new guidance law is proposed- an adaptation of the vector guidance law for the endo-atmospheric case, in which the relative acceleration is assumed to be quasi-constant and therefore its effects throughout the flight, and likewise its effects on the miss distance, are known. This new law allows better performance in terms of miss distance, with greatly reduced computational intensity, while only requiring minimal control acceleration.

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מרכז הסמינרים