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 ה׳ 20.06.2019
(י״ז בסיון, תשע״ט), בניין דן קאהן, אודיטוריום 1,   45 :13.

<u>מרצה</u> :   אוריאל חלבני

<u>מנחה</u> :   פרופ׳/ח יזהר אור

<u>על הנושא</u>:

דינמיקה לא הולונומית של רכב Twistcar:
אנליזה אסימפטוטית ודינמיקה היברידית של החלקות
Nonholonomic dynamics of the Twistcar vehicle:
asymptotic analysis and hybrid dynamics of frictional skidding

The seminar will be given in Hebrew

<u>תקציר ההרצאה</u> :

   The Twistcar vehicle is a classic example of a nonholonomic dynamical system. The vehicle model consists of two wheel-supported links connected by an actuated joint, where the nonholonomic constraints impose no skidding of the wheels. Recent experimental measurements conducted with a robotic Twistcar prototype have shown disagreements with predictions of previous theoretical analyses. In particular, significant skidding has been observed, in addition to discrepancies with respect to theoretical predictions of divergence in oscillations of the vehicle's speed and orientation, as well as direction reversal depending on the vehicle's structure.

   The goal of our research is to resolve this disagreement by generalizing the theoretical analysis. First, we extend previous asymptotic analysis by incorporating the effects of links' inertia and oscillation amplitude of the input angle on the direction of net motion. Additionally, we formulate the vehicle's hybrid dynamics under frictional slip-stick transitions. Using numerical analysis, we obtain optimal values for the vehicle's mean speed and energy expenditure as a function of the input frequency. Our results improve the agreement between theory and experiments and suggest directions for further experimental investigation.

בברכה,

פרופ״א אמני סאס
מרכז הסמינרים