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' 22.06.17
(כח' בסיון, תשע"ז), בניין דן-קאהן, אודיטוריום 1 , 13:30.

ירצה: אוריה הלר

מנחה: פרופ'/ח דורון שילה, הפקולטה להנדסת מכונות
מנחה שותף: דר' אילון פארן, הפקולטה להנדסת מכונות

על הנושא:

A novel SMA-based experimental system for applying a rectangular stress pulse at the sub-*ms* time scale

The seminar will be given in Hebrew

להלן תקציר ההרצאה:

One of the major challenges in experimental techniques for studying the dynamic response of materials is the ability to control the stress state within the tested sample. In particular, existing methods for high strain rate experiments lack the ability to apply load-controlled conditions. In this work we present the design, development and testing of a novel experimental system that generates stress-controlled pulses with an approximately rectangular shape and durations in the ms time scale.
The system's operating principles are based on experience gained from recent projects related to ultra-fast actuation of shape memory alloy (SMA) wires subjected to electric pulses at the μs-scale. Under these conditions, it was shown that the stress in the SMA wires reaches a plateau after few hundreds of μs, and the amplitude of the stress can be controlled by adjusting the electric energy that actuates the wire. The presented setup incorporates two antagonistic SMA NiTi wires; the first is used for loading the tested sample and the second for releasing the load. The time delay between the actuation of the two wires determines the duration of the stress pulse. The experimental system is mounted under an optical microscope, allowing fast in-situ photography of the moving interfaces during the stress pulse.
The first demonstration of this novel method involves studying the dynamics of individual twin boundaries in a ferroic NiMnGa crystal. The temporary velocities of individual interfaces are measured under different values of the applied stress, demonstrating the feasibility of a direct mechanical measurement of the kinetic relation for twin boundary motion. Advantages, limitations and future application of the new experimental method are discussed, indicating that this technique has the potential to contribute significantly for studies of various mechanical and physical properties that involve high strain rates.

בברכה,

פרופ"מ שמואל אוסובסקי
מרכז הסמינרים