

סמינריון

11.04.21 הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום א'

כ"ט בניסן, תשפ"א, בשעה 13:30 באמצעות הזום :

<https://technion.zoom.us/j/96626480647>

מרצה : דוד חסין

מנחה : פרופ' דוד גרינבלט

על הנושא :

Dielectric Barrier Discharge Plasma Flow Control on a Low Aspect Ratio Wing

The seminar will be given in English

תקציר ההרצאה :

The ability to maintain attached air flow over aerodynamic surfaces characterizes the performance of airborne vehicles and sets their operational limits. Stalling of lifting surfaces, characterized by boundary layer separation and typically caused by excessive angles-of-attack or wind gusts, produces a loss of lift and increased drag. These problems are amplified in the case of Micro Air Vehicles (MAV) that fly in highly turbulent and unsteady environments. In this work, we use dielectric barrier discharge (DBD) plasma actuators to mitigate stall effects on a square planform, aspect ratio one, wing that is considered prototypical of an MAV. The wing has a nominal NACA 0015 profile with interchangeable leading-edges to accommodate different actuator configurations. Wind tunnel load experiments were conducted at Reynolds numbers $\leq 6 \times 10^5$, where the actuators were pulse-modulated at relatively low $O(1)$ and relatively high $O(10)$ reduced frequencies. Actuation increased maximum lift by more than 30%, increased the stall angle by up to 4° and a significantly ameliorated hysteresis. High reduced frequencies produced higher maximum lift, but the low reduced frequencies produced greater lift increases at large post-stall angles. It was determined that excitation of either a small [$O(10^{-2})$ of chord] or large [$O(10^{-1})$ of chord] leading-edge separation bubbles was responsible for these observations. Extensive tuft-based flow visualization on the wing surface and in its wake clarified the mechanism of stall and stall control. A major factor both stall and its control are the lift-producing tip vortices that dominate low aspect ratio aerodynamics.

בברכה,

ד"ר איתי סאס
מרכז הסמינרים