סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 25.11.21
(כ״א בכסלו, תשפ״ב), בשעה 10:00 באמצעות הזום : https://technion.zoom.us/j/7394020109

מרצה :   דוד רוזנשטוק

מנחה :   פרופ׳ דוד אילתה

על הנושא:

NON-LINEAR VIBRATIONS OF A THIN CIRCULAR RING

The seminar will be given in Hebrew

תקציר ההרצאה :

Micro gyros are an essential component that enables navigation using hand-held devices, such as smartphones. Micro gyros are implemented in silicon devices using Micro-Electro-Mechanical Systems (MEMS) technology. There are two families of structures that are used in micro gyros, and this work is motivated by the vibrating-ring gyros.

In this work we analyze the free-vibration solution of a thin ring, and focus on the second elliptic mode. Specifically, we investigate how the mode-shape and frequency are changed as the amplitude of vibration increases. Theoretical and experimental previous work has shown that the natural frequency of a thin ring, decreases with increasing amplitude of vibration. As much of this work has been in the context of MEMS gyros, and as the models included gap-closing electrostatic transduction for driving and sensing, it has been often claimed that the decrease in natural frequency is due to nonlinear effects of electrostatic transduction. Surprisingly, many previous studies considered an incomplete solution of the problem.

In this work we use rigorous analysis to derive the nonlinear natural frequency of a thin ring. We use several analytical and numerical methods to validate our findings. We demonstrate that the decrease in natural frequency is due to a purely mechanical reason, and we provide a new interpretation of this phenomenon.

בברכה,

פרופ״ח אמי סאו
מרכז הסמינרים