הטכניון TECHNION
Israel Institute
of Technology
מכון טכנולוגי
לישראל

הפקולטה
להנדסת
מכונות
Faculty of
Mechanical
Engineering

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד׳ 09.12.2021
(ה׳ בטבת, תשפ״ב), בשעה 10:30 באמצעות הזום :
https://us04web.zoom.us/j/79474989129?pwd=Wjl0VnJEKzZMYlhXUENwQ3VsRU9LZz09 (ניתן להעתיק
קישור לדפדפן אינטרנט)

מרצה :   יוגב בוזגלו

מנחה :   פרופ׳ אלי אלטוס

על הנושא: Stress - Moduli Monotonicity in Heterogeneous Elastic Structures for Improved Design

The seminar will be given in Hebrew

תקציר ההרצאה :

Topology optimizations which deal with reduction of compliance, stress, mass etc. are well studied and developed in the literature. Many studies were done to reduce computational time and increase the accuracy. Bounds on problem parameters necessitate iterative process with "punishment functions".

In this study, analytical relations between stress and moduli in heterogeneous elastic structures were identified and implemented in the optimization process. The accuracy was improved, and computational time was reduced considerably.

First, analytical investigation was done on a simple, fixed-simply supported beam, in which the heterogeneous compliance distribution is bounded between lower and upper limits. Monotonicity between reaction forces and compliance was verified and used to prove that extremal reaction forces are achieved by a compliance field containing S_{max} and S_{min} only, with step functions.

In addition, compared of the well-known sensitivity analysis in gradient-based optimization, The optimal results are achieved by solving only one single equation.

Similar analytic relations were found to minimize the forces in a truss, and then generalized into minimization of stress in general elastic structure, validated by numerical examples.

It is suggested to implement the above monotonicity property in complex structural design such as PCB layout, where this approach can improve reliability and durability of electronic components.

בברכה,
פרופ״ח אמי סאו
מרכז הסמינרים