Stress-Moduli Monotonicity and Optimized Material Morphology

The seminar will be given in Hebrew

Design of material morphology for improved mechanical properties has a great potential and is in its' infancy.

It was found in previous work (Krush’s MSC 2013), that a reaction force R of an indeterminate beam is monotonic with local moduli. Therefore, the extremal R is related to a special non-continuous moduli field, which reduces the difficulty of finding the \( R_{\text{extremal}} \) morphology.

\( R_{\text{max}} \) is strongly related to structural strength. Therefore, the target of this study is to exploit the monotonicity property in order to design improved morphologies. The analysis is generalized in three directions:

a. Beams with multiple supports
b. Internal forces in truss structures
c. General elastic body with concentrated boundary forces.

The morphologies found by using the monotonicity were verified for two examples by a numerical optimization algorithm (MMA).

Current study is focused on finding morphologies which minimize the maximum internal force. Distributed boundary stresses will also be examined.

ברכה,

[Name]

מרצה הסמינריים