Applied Mathematics Seminar
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Bounds for properties of thermo-elastic composites

by

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Abstract

The thermal activator is a cantilever that moves its free end in a prescribed fashion when it is heated. It is an example of a device made of an active material that change its shape when activated. To design activators, one considers thermal-elastic composites: Structures of several materials with different thermal expansion coefficients and different elastic moduli. The effective thermal expansion is a tensor that show the change of a shape of an element under heating.

In the talk, we discuss new bounds for effective properties of thermal-elastic composites. The obtained bounds link together the expansion tensor and the elasticity tensor of a structure. The results are applicable as well to the extension due to phase transform.

Using these bounds as constraints, we formulate a numerical problem of a coupled bound between several elastic and expansion parameters; the other effective parameters are treated as controls to enlarge the bound.

This talk describes a joint research with Ole Sigmund (Department of Mechanics, Danish Technical University)