

Poster presentation

About Self-Penalization in Topology Optimization

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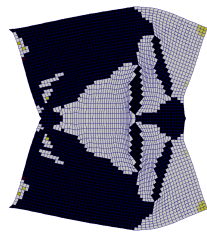
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Abstract

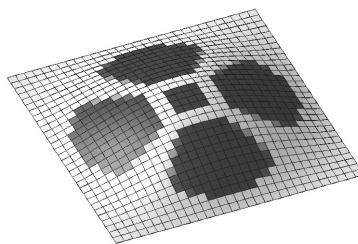
The variable thickness sheet problem for compliance minimization with volume constraint possesses a unique solution which is known to have intermediate pseudo density values. The SIMP model, which avoids intermediate pseudo density by an explicit penalization approach, leads to an ill-posed problem generating the need to regularize. However, computationally efficient regularization techniques tend to add some intermediate material to the solution.

Within the talk we consider general topology optimization problems with a linear continuous design variable without additional constraints beside box constraints on the design variable. We speak of *self-penalization*, when the solution of the mentioned problem shows only a low amount of intermediate design values but a distinct *black and white* design.

Indeed, the phenomenon of self-penalization appears for several problems beside compliance minimization. It is especially of interest when there is no problem specific motivation to restrict the amount of pseudo material but one is also interested in the optimal amount of material. Piezoelectric problems have been discussed in [1].



(a) static force inverter



(b) dynamic piezoelectric actor

References

- [1] Fabian Wein, Manfred Kaltenbacher, Barbara Kaltenbacher, Günter Leugering, Eberhard Bänsch, and Fabian Schury. On the effect of self-penalization of piezoelectric composites in topology optimization. *Structural and Multidisciplinary Optimization*, 43(3):405, 2011.