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Optimality conditions for mass design problems and applications to thin plates

In this talk I shall present some results recently obtained in a joint work with Guy Bouchitté. We consider a quite large class of structural design problems which can be roughly formulated as follows: under a given load and a total volume constraint, minimize a suitable notion of compliance among all admissible mass distributions, represented by positive measures with prescribed integral mean. For such problems, we derive necessary and sufficient optimality conditions. As a special case, we focus attention on the optimization of thin plates; we detail the corresponding optimality conditions and we show how they can be handled in order to determine analytically some optimal plates.