

The two-norm discrepancy in second order shape optimization methods

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For second order sufficient optimality conditions, the two-norm discrepancy is essential: shape differentiability is ensured in a certain space, but the shape Hessian of integral objectives cannot be coercive in this strong norm. However, the second order remainder allows a refined estimate in a weaker space. Hence, a strict local minima of second order is provided by strict coercivity in the weak norm. Ill-posedness of a shape problem takes place, if the shape Hessian at stationary domains defines a compact, degenerate operator. We will present illustrational examples for both cases.

Finally, we will comment on some algorithmic aspects of the abovementioned considerations. In particular, we recommend a modified viewpoint for the use of the Hadamard shape gradient representation in descent algorithms.

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