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Self-adjoint problems in the optimization of non-linear pde models

Wednesday, June 26, 2024 9:00 AM (1 hour)

We consider optimization problems under partial differential equation constraints. It is assumed that the p.d.e. arises from the minimization of a convex non-linear (non-quadratic) energy. We prove that the optimization problem is self-adjoint when the objective function is the dual energy. In other words, the differential of the objective function with respect to the optimization variable does not involve any adjoint state. This result generalizes the well known fact that the so-called compliance is self-adjoint in the linear case (quadratic energy).

We show some applications for the shape and topology optimization of electrical machines in the 2-d magnetostatic context.

This is a joint work with Théodore Cherrière, Thomas Gauthey, Maya Hage Hassan, Xavier Mininger.

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