Optimization Problems with Manifolds as Controls

Giuseppe Buttazzo (buttazzo@dm.unipi.it)

Dipartimento di Matematica
Università di Pisa
Via Buonarroti, 2
56127 PISA (Italy)
http://www.dm.unipi.it

Abstract. We present an attempt to treat optimal control problems where the control variable is a manifold. The problems are written in the form

$$\min\big\{F(M,u)\ :\ M\in\mathcal{M},\ u\in X(M),\ E_M(u)=0\big\}$$

where the manifold M plays the role of control variable, $\mathcal{M}$ is the class of admissible choices, $X(M)$ is the space of states, F is the cost functional, and E_M is some differential operator on M which provides the state equation. A typical example of this kind of problems is given by the Euler *elastica*. The idea is to relax the problem embedding the class of admissible controls into the larger class of nonnegative measures.

References

[1] G. BOUCHITTE, G. BUTTAZZO, I. FRAGALÀ: *Mean curvature of a measure and related variational problems.* Ann. Scuola Norm. Sup. Pisa Cl. Sci., **25** (1997), 179–196.

[2] G. BOUCHITTE, G. BUTTAZZO, I. FRAGALÀ: *Convergence of Sobolev spaces on varying manifolds.* Preprint Dipartimento di Matematica Università di Pisa, Pisa (1999).