

# Méthodes de contrôle optimal en optimisation de forme / Optimal Control Methods in shape Optimization

*mardi 22 mai 2018 15:00 (1 heure)*

A typical example of shape optimization problems has the form:

$$\min_{\Omega \in \mathcal{O}} \int_{\Lambda} j(x, y_{\Omega}(x), \nabla y_{\Omega}(x)) dx,$$

$$-\Delta y_{\Omega} = f \quad \text{in } \Omega,$$

$$y_{\Omega} = 0 \quad \text{on } \partial\Omega$$

with other supplementary constraints (on  $y$ ,  $\Omega$ , etc.), if necessary. Here,  $\Omega \subset D$  is an (unknown) domain,  $D$  is some given bounded Lipschitzian domain,  $f \in L^2(D)$ ,  $j(\cdot, \cdot, \cdot)$  is a Caratheodory mapping and  $\Lambda$  is either  $\Omega$  or some fixed subdomain  $E \subset D$ .

Let me also mention that many geometric optimization problems arising in mechanics (for plates, beams, arches, curved rods or shells), are expressed, as well, as optimal control problems by the coefficients, due to the special form of their models. This point is not discussed here.

The presentation will discuss in detail two cases: optimization of a plate with holes and a penalization approach to a general shape optimization problem. Boundary observation problems will also be presented if time allows.

An essential ingredient in these developments is the implicit parametrization method that allows an advantageous description of implicitly defined manifolds via iterated Hamiltonian systems.

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