On Optimal Design of Elastic Plates in a Dynamic Contact

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Abstract: We deal with an optimal design problem governed by initial-boundary value problems for a hyperbolic variational inequality describing deflections of elastic plates vibrating against an inner rigid obstacle. A variable thickness of a plate plays the role of a control variable. The set of admissible states for the design problem consists of solutions of a state problem gained as limits of the sequences of functions solving penalized problems. We assume the generalized penalized function $u \mapsto \eta^{-1}\beta \left(u - \frac{1}{2}e - \Phi\right)$ with a deflection u, a thickness function e and an obstacle function Φ . In the case of a differentiable function β and other more regular data it is possible to derive generalized optimality conditions starting with penalized problems. We apply the approach from [1], where a viscoelastic plate was considered. This case is an addition to the control problems solved in [2].

References

- [1] Bock, I. and Lovíšek, J.: Optimal control of a viscoelastic plate with respect to a thickness. Math. Nachrichten 125 (1986) 135-151.
- [2] Bock, I.: An optimal control problem with respect to variable thicknesses for a vibrating elastic plate in a contact with a rigid obstacle. SEMA Journal, March 2025.