Robust averaged control of vibrations for the Bernoulli-Euler beam equation

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In this talk, an approach for the robust average control of random vibrations for the Bernoulli-Euler beam under uncertainty in the flexural stiffness and in the initial conditions is presented. These sources of uncertainty are modelled by random fields. The problem is formulated in the framework of optimal control theory and the second order statistical moment of the random system response at the control time is incorporated in the cost functional as a measure of robustness. The numerical resolution method combines a classical descent method with an adaptive anisotropic stochastic collocation method for the numerical approximation of the statistics of interest. Several numerical experiments illustrate both the performance of the proposed method and the significant differences that may occur when uncertainty is incorporated in this type of control problems. This phenomenon has also been observed in the context of robust structural optimization [1].

This is a joint work [2] in collaboration with J. Martínez-Frutos and F. Periago.

[1] Martínez-Frutos, J., Kessler, M., Periago, F., Robust shape optimization of continuous structures via the level set method, *Comput. Methods Appl. Mech. Engrg. 305 (2016), 271-291.*

[2] Marín, F. J., Martínez-Frutos, J., Periago, F., Robust averaged control of vibrations for the Bernoulli-Euler beam equation, *Submitted.*