SOME ASPECTS OF OPTIMAL CONTROL

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Abstract

Applications of the optimal control problems arise in many fields of engineering and science. This talk presents a brief overview of the main ideas and concepts of optimal control problems. The discussion will take place in terms of the distributed parameter systems and on its applications to active control of smart mechanical systems and possible other applications will be introduced. The behavior of smart mechanical systems involving the control of vibrations are modeled through partial differential equations that involve unit step functions and their derivatives due to pathces. Engineering applications of the patches can be seen in beams, plates, etc. The solution of the problem necessitates the implementation of numerical or approximate methods. The applications of these methods to piezolaminated smart beams using actuators will be discussed to illustrate the main ideas [1].

$$\mathcal{L}[w] = Kf(t)\Big(\mathcal{H}''(x-x_1) - \mathcal{H}''(x-x_2)\Big), \quad 0 < x < L, 0 < t < t_f, \quad (1)$$

Optimal control of nonlinear applications will also be presented briefly [2] along with possible future projects.

Keywords: Optimal Control, Maximum Principle, Variational Methods

References

[1] I. Kucuk, I. S. Sadek, E. Zeini and S. Adali, Optimal vibration control of piezolaminated smart beams by the maximum principle, *Computers and Structures* **89** (2011) 744-749.

[2] I. Kucuk and I. Sadek, A robust technique for solving optimal control of coupled Burgers equations, *IMA Journal of Mathematical Control and Information* **28** (2011) 239-250.

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