

Title: Interactions of DC motors and mechanical structures: stability, vibration and their control

Abstract:

The present work approaches with two different methods the problem of vibration control encountered in civil and mechanical engineering. A situation which consists of one or more Direct Current motors with limited power supply and fixed on a mechanical structure is studied all along this thesis. The first step consists on the use of some electric transducers to reduce the amplitudes of vibration of a beam or a plate. A good choice of physical parameters of the transducers devices enhances the efficiency of the control strategy. Stability analysis of the controlled system confirms the pertinence of the control strategy.

The second method is rather based on the synchronization between the external sources (DC motors) working on the structure. Here, the physical parameters of the structure allow showing the phase and anti-phase synchronization phenomenon between the motors. This difference of phase between the motors and their voltage apply leads to the situation where the amplitudes of vibrations are considerably reduced in the mechanical structure.

Keywords : Beam ; plate ; vibration control ; DC motors ; limited power supply ; electric transducers ; synchronization.

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