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Vibration Control of flexible 3D robot arm with join and distributed actuators

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An active vibration control system is proposed for suppressing amplitude vibration of flexible 3D robot arm. This system integrates control algorithms, intelligent materials and software technologies. The mathematical model of physical system is based upon the geometry and properties of an experimental set-up consisting of a Flex3D robot with a flexible joints and flexible arm. The tip of the arm is loaded by eccentric mass. The vibrations of the plate are measured by the application of a grid of strain sensors and pair of coupled gyroscope-accelerometer. Two kinds of actuators are used. The first is a grid of PZT elements which form a local segments of compensators. Second is a standard BLDC motor located in the join. For the considered system the linear and non-linear (Neural Network of Runge-Kutta type models) of discrete-time model identification for real-time active vibration control have been applied. The mathematical model obtained by this method identification is then employed for the two class of controllers: linear pole placement controller for local segments compensators and non-linear reduced model reference for servo- controller. Virtual simulations are included and discussed.