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Dynamic Modeling of a Robot for Playing a Curved 3D Percussion Instrument Utilizing a Finite Element Method

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Abstract : The Finite Element Method is commonly used in the analysis of flexible manipulators to predict elastic displacements and develop joint control schemes for reducing positioning error. In order to preserve simplicity, regular geometries, ideal joints and connections are assumed. This paper presents the dynamic FE analysis of a 4- degrees of freedom open chain manipulator, intended for striking a curved 3D surface percussion musical instrument. This was done utilizing the new MultiBody Dynamics Module in COMSOL, capable of modeling the elastic behavior of a body undergoing rigid body type motion.

Keywords : dynamic modeling, entertainment robots, finite element method, flexible robot manipulators, multibody dynamics, musical robots
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