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Technical paper

Impedance control of industrial robots â˜†

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Abstract

Manipulation fundamentally requires the manipulator to be mechanically coupled to the object being manipulated. A consideration of the physical constraints imposed by dynamic interaction shows that control of a vector quantity such as position or force is inadequate and that control of the manipulator impedance is necessary. Techniques for planning and control of manipulator behavior are presented which result in a unified approach to target acquisition, obstable avoidance, kinematically constrained motion, and dynamic interaction. A feedback control algorithm for implementing a cartesian end-point impedance on a nonlinear manipulator is presented. The modulation of end-point impedance independent of feedback is also considered. A method for choosing the impedance appropriate to a task using optimization theory is discussed.

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â˜† This paper brings together material which has been presented in part elsewhere.

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