

Multibody Systems Analysis and Optimal Control Theory Produce Coordinated Motions for Robots and Animals

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Abstract

Current robots are not nearly as agile, graceful, or coordinated as animals, and this limits their usefulness in accomplishing complex tasks. If the movement capabilities of robots were extended, they could perform a wider range of tasks in hostile environments that are too dangerous for humans. This talk presents results that we have obtained to improve the movement capabilities for some robot systems. We use a numerically efficient representation of the multibody dynamic equations and their derivatives with an efficient nonlinear optimal control solver to produce the motions. These motions are remarkably coordinated looking and human-like. We will show some recent work on the application of these ideas to human gait rehabilitation and to arm movement therapy.