

## Exact Tracking Control for Nonlinear Structural and Mechanical Systems

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Based on recent results from analytical dynamics, this paper develops a class of tracking controllers for controlling general, non-linear, structural and mechanical systems. Unlike most control methods that perform some kind of linearization and/or nonlinear cancellation, the methodology developed herein views the nonlinear control problem from a very different perspective. It utilizes recent, fundamental developments in an allied field – analytical dynamics – to obtain closed-form expressions for the tracking controller. This leads to a simple and new control methodology that is capable of ‘exactly’ maintaining the nonlinear system along a certain trajectory, which, in general, may be described by a set of differential equations in the observations/measurements. The approach requires very little computation compared to standard approaches. It is therefore useful for on-line, real-time control of nonlinear systems. The methodology is illustrated with examples.

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