

# Trajectory controllability, optimal trajectory tracking, exact linearization and all that

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Abstract.

We consider the task of forcing a phase space trajectory of a dynamical system as closely as possible along a desired trajectory. Using the regularization parameter of an appropriately formulated optimal control problem as the small parameter, we develop a perturbation approach which allows to interpret a singular optimal control problem as a singularly perturbed system of ODEs. Surprisingly, for a certain class of nonlinear control systems as e.g. one-dimensional mechanical systems, the perturbative treatment of this ODE reduces to exclusively linear equations. The nonlinearity is eaten by the control while the solution for the controlled trajectories, being independent of the nonlinearity, is universal for the control system at hand.