

Optimal Control of a Spherical Inverted Pendulum

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Abstract

Inverted pendulums are important elements of many systems in mechanics, engineering, robotics etc. Moreover, inverted pendulums are widely used in design and testing of microcontrollers which are to be implemented in complicated and expensive real systems. We consider a mathematical model of a spherical inverted pendulum on a movable cart. The cart moves on a horizontal plane under the influence of a planar bounded force. We study an optimal control problem related to this model. The control objective is to stabilize the inverted pendulum in the upright equilibrium position. For the linearized model we show that the optimal solutions contain singular arcs.

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