



Research Article

Toward a generalized sub-optimal control method of underactuated systemsJ. Patricio Ordaz-Oliver^{1,*}, Omar J. Santos-Sánchez¹, Virgilio López-Morales²

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Keywords: dynamic programming; sub-optimal control; experimental underactuated systems; passivity; Pendubot; rotatory pendulum**Abstract**

In this paper, some experimental results and a performance analysis of a general control methodology for swinging up and stabilizing underactuated two-link robots are presented. The analyzed methodology is based on Euler–Lagrange dynamics, passivity analysis, and dynamic programming theory. The applied control method preserves the general structure of a suboptimal control approach, while the functional defining a performance index is based on the underactuated system energy. In order to illustrate the presented approach, the swing up and stabilization control of two experimental electromechanical underactuated systems about an unstable equilibrium point are shown. Copyright © 2011 John Wiley & Sons, Ltd.

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