Double Actuated Planar Single Legged Hopping Robot Forward Speed and Hopping Height Control

Ahmed Adel Ahmed Fahmy Soliman ,A.L. Elshafei;K.A. Metwalley

Abstract

This paper shows a control method for controlling the forward speed and hopping height of a double actuated planar single legged hopping robot (SLHR). A full representation of the SLHR dynamic performance under the effect of its passive components within appropriate selected initial conditions is shown as the paper discusses the steps for selecting these initial values based on simple ballistic equations. Two types of control algorithms are used to control both actuated robot joints. First a PD control algorithm is tuned to force the hip revolute joint to track the desired trajectory which is related directly to the robots forward speed. Second an energy based controller is introduced to control the knee joint providing the thrust force for the robot to reach its performance at its different operation modes.

5th International Conference on Modeling & Control Cairo, Egypt August 31st ï September 1st, 2013 2013, January