Dynamics Synchronization of the Running of Planar Biped Robots With SLIP Model in Stance Phase

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ABSTRACT

abstract

In this work a control law is derived to synchronize dynamics of multibody biped robots and the spring loaded inverted pendulum (SLIP) model in stance phase of running. The goal is to use the vast literature on the SLIP model dynamics for the control of real multibody robots. Three kneeed biped robot models are considered in this work: with springs parallel to motors, with springs series to motors, and without springs. Dynamic equations of the multibody biped models are derived using Lagrange equation and then the applicability of the derived control law to these models are investigated using simulation. The initial state of the multibody robot is found such that its center of mass (CoM) has the same initial condition as SLIP model. Then the trajectory of its CoM is compared to SLIP model. Also motor torque profiles are compared for the models with and without springs and also for the motors with and without rotor inertias. The results show that the effect of rotor inertia is a big challenge in implementing fast biped running on real robots.

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