

Dynamics and Optimization

Chairs: Abhinandan Jain, Beom-Hee Lee

Unified Motion Specification and Control of Kinematically Redundant Manipulators

J. Park, W. K. Chung and Y. Youm
Pohang University of Science & Technology (POSTECH)

- Analysis and control of kinematically redundant manipulators in an effective and unified way
- Kinematically decoupled joint space decomposition technique to model the dynamics of self-motions and incorporate various inverse kinematic methods
- Experimental verification using a planar 3 DOF direct drive arm
- Successful specification and control of motion for redundant manipulators



Balancing of an Inverted Pendulum with a Redundant Direct-Drive Robot

Chi Youn Chung, Jin Won Lee, Sang Moo Lee and Beom Hee Lee
Seoul National University

- Stabilizing the base-excited inverted pendulum around its upright position with a robot
- Hall-effect sensor system, Redundancy utilization, Acceleration observer/controller
- Good performance at the best configuration with a stable limit cycle
- Balancing of the 2-DOF pendulum with the 3-DOF direct-drive robot is unique.

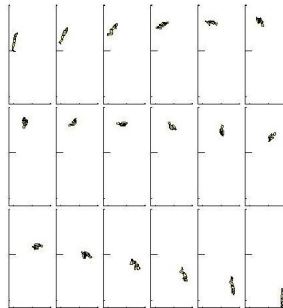


On the Computation of Optimal High-Dives

J. V. Albro¹, G. A. Sohl¹, J. E. Bobrow¹ and F. C. Park²

¹University of California, Irvine and ² Seoul National University

- Want to generate realistic human motion, e.g. platform dives
- Solve related optimal control problem with analytic gradients
- Only had to specify 8 parameters to get successful dives
- Can get some human-like motions relatively easily this way



Modeling of Mechanical Systems with Lumped Elasticity

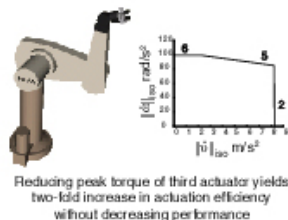
W. Khalil and M. Gautier
IRCyN - Ecole Centrale de Nantes

- - Modeling mechanical systems with lumped elasticity. For high speed machine tools and robots with elastic joints.
- - Robotics classical notations have been used, the geometric and kinematic models are directly obtained.
- - The inverse dynamic model has to be redefined and developed.
- - Applications concern the simulation and control of such systems.

Robot Acceleration Capability: The Actuation Efficiency Measure

Alan Bowling and Oussama Khatib
Stanford University

- Problem: Measure actuator oversizing for desired performance.
- Purpose: Aid in robotic manipulator design.
- Method: Analysis of dynamic model and actuator torque bounds.
- Feature: Unified study of linear and angular motions.



Trajectory Planning of Robots with Dynamics and Inequalities

N. Faiz and S. Agrawal
University of Delaware