Grasping and Contact

Organizers & Chairs: Antonio Bicchi, Vijay Kumar

Robotic Grasping and Contact: A Review

A. Bicchi[1] and V. Kumar[2]
[1]University of Pisa and [2]University of Pennsylvania

- Fixturing, Dexterous Manipulation and Enveloping
- Closure Properties of Grasps
- Force Analysis
- Kinematics of Contact and Contact Compliance

Controllability of Single Input Rolling Manipulation

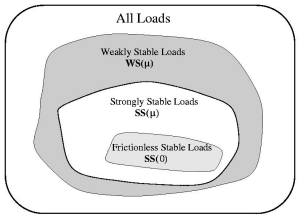
P. Choudhury and K. Lynch
Northwestern University

- Controllability of underactuated systems with rolling contacts.
- Geometric mechanics and non linear control.
- Single input system consisting of a ball rolling inside an ellipsoid is globally controllable.
- Controllability can be achieved for underactuated systems with assymetries in motion and curvature.

Stability Characterizations of Fixtured Rigid Bodies with Coulomb Friction

J. S. Pang[1] and J. C. Trinkle[2]
[1]Johns Hopkins University and [2]Sandia National Labs

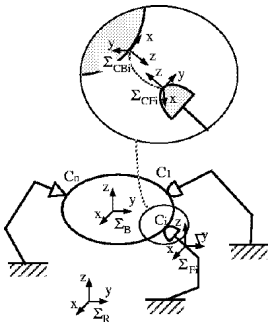
- Is an object fixtured without form closure stable?
- Past analyses are overly conservative.
- Can determine stability with friction accurately using complementarity theory.
- Can construct the exact set of stable loads using complementary cones.



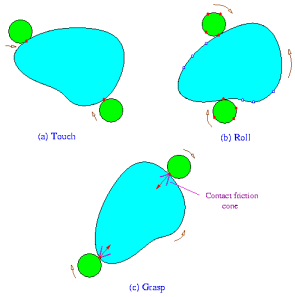
Control Algorithm for Grasping and Manipulation by Multifingered Robot Hands Using Virtual Truss Model Representation of Internal Force

T. Yoshikawa
Kyoto University

- System Description and Constraint Conditions
- Internal Force Representation Based on Virtual Truss Model
- Control Algorithm for Fixed and/or Rolling Contacts
- Extension to Case of Sliding Contacts



Grasping Curved Objects through Rolling

Y. B. Jia
Iowa State University

- Introduction
- Finger Localization Using Total Curvature
- Grasp Achievement under Rolling
- Simulation Results