Grasp Analysis and Optimization
Chairs: R. D. Howe, H. Lipkin

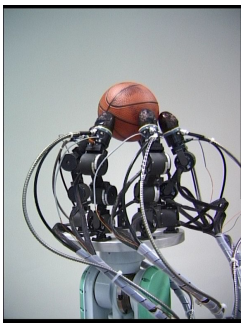
Metrics for analysis and optimization of grasps and fixtures
Thomas G. Sugar[1] and Vijay Kumar[2]
[1]Arizona State University and [2]University of Pennsylvania

Regrasping Behavior Generation for Rectangular Solid Object
Y. Hasegawa, J. Matsuno and T. Fukuda
Nagoya University

- Generation of regrasping motion for a four-fingered robot hand.
- Using Evolutionary Programming(EP).
- Rotation of rectangular solid object with regrasping motion.
- We control the real robot hand using the controller designed in computer simulations.

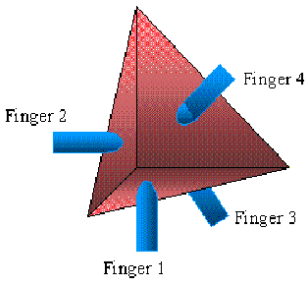
Computing 3-D Optimal Form Closure Grasps
D. Ding, Y. Liu and S. Wang
The Chinese University of Hong Kong

- Constructing a form-closure grasp is of significance for grasp and regrasp planning.
- Given grip points of more than 2 fingers, find optimal grip points for the other fingers.
- The problem is formulated as a NLP problem.
- The performance is verified by two examples.

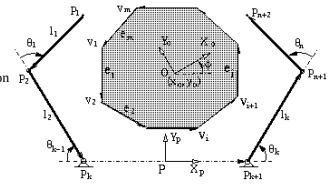


The Synthesis of 3-D Form Closure Grasps
D. Ding[1], Y. Liu[1] and S. Wang[2]
[1]The Chinese University of Hong Kong and [2]Harbin Institute of Technology

- A formulation of the synthesis of 3-D frictional form-closure grasps.
- By a recursive reduction technique, the 6-D problem is transformed to a 3-D one.
- The form-closure condition is equivalent to the inconsistancy of linear inequalities.
- Numerical simulation results are provided to show the efficiency.



Precision Localization and Robust Force Closure in Fixture Layout Design for 3D Workspaces
M. Y. Wang and D. Pelinescu
University of Maryland

Kinematic Graspability of a 2D Multifingered Hand
Y. Guan and H. Zhang
University of Alberta

- Kinematic feasibility analysis is to determine whether a desired grasp is achieved by the hand with respect to the object, under the consideration of hand kinematics and object geometry.
- Two constraints in a grasp, contact constraint and collision-free constraint, are evaluated in terms of triangular areas. The analysis is then modeled as a constrained nonlinear global optimization problem.
- Numerical examples including the grasps of a rectangle and a disk by a two-fingered hand are provided.
- The unified and effective method gives a definitive answer to kinematic graspability analysis. It is applicable to various 2D grasps including fingertip grasps and power grasps.