

**Assignment 3;
due Wednesday November 11**

Part 1

Exercise 1

Solution

According to [1], Manocha and Zhu (1994) proposed a generalized closed form solution which can be derived for 6 DOF (or less) kinematic chain.

- (a) False. It is possible that the target for EE is unreachable.
- (b) False. It is possible that the target for EE is unreachable.
- (c) False. It is possible that the target for EE is unreachable.
- (d) True.

Exercise 2

Solution

- (a) False. 3 DoF manipulator with rotation joints can have only 2 dimension work-space
- (b) False. Dextrous can be empty.
- (c) True. E.g. 1 DoF manipulator with 2 dimension work-space and rotation joint with different length of links.
- (d) False.

Exercise 3

Solution

- (a) True.
- (b) False. Usually we go from trigonometric to transcendental equations.
- (c) True. We use FK during solving IK.
- (d) True. IK problem needs a very fast computational engine in order to make solution in real-time.

Exercise 4

Solution

- (a) False. We have considered the case of revolute joints.
- (b) False. Links are not important in IK it can only affect the work-space.
- (c) False. It is solution for manipulators with 6DOF's when three consecutive axis intersect.
- (d) False.

Part 1

Exercise 1

Solution

List of references

[1] CLOSED FORM AND GENERALIZED INVERSE KINEMATIC SOLUTIONS FOR ANIMATING THE HUMAN ARTICULATED STRUCTURE. Kwan W. CHIN