Meeting: 1001, Evanston, Illinois, SS 9A, Special Session on Solving Polynomial Systems

1001-14-421 **Eric C Lee*** (chingkui@yahoo.com), Dept of Mechanical and Industrial Engineering, Snell Engineering Center, Northeastern Univ, 360 Huntington Ave., Boston, MA 02115, and **Constantinos Mavroidis**. *Solving the Polynomial Equations of the Geometric Design Problem of the Spatial 3R Mechanisms.*

In this presentation, I will talk about the computational geometric design of mechanisms. Mechanisms are articulated mechanical systems composed of links interconnected by joints. Usually, a mechanical device known as the end-effector is attached at a special link. In many applications, the end-effector is required to reach a number of task positions which are also known as precision points. To design a mechanism that meets such a requirement, we need to determine the dimensions of the mechanism's geometric parameters so that its end-effector can reach the locations. The geometric design equations arised are complicated polynomial equations systems. In this talk, I will focus on our research results in the design of the serial open-chain revolute-revolute-revolute (3R) manipulators. We have studied the 3R design problems when three, four or five precision points are specified using algebraic method, continuation methods and interval analysis. Despite the devoted effort,! the most difficult 3R design problem with 5 precision points specified remains too complicated to be solved completely. I will outline the methods we used and the results we obtained together with the open problems in this area. (Received September 01, 2004)