A Study of the Design and Motion Characteristics of the Joing-Glide Type Parallel Mechanism

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ABSTRACT

Parallel space mechanisms have been evolved drastically due to the computer progress. However, the researches for the parallel space mechanism of joint-glide type are still little. This type of mechanism can move faster with more rigidity and more output force than other related types of mechanisms. Therefore, it is suitable for machining processes under heavy load. The parallel space mechanism of joint-glide type is under the U.S. patent no. of 5715729. It is a parallel space mechanism of six degrees-of-freedom with 14 links and 18 joints. It consists of six connecting rods of fixed length, one end of which connects the movable platform by ball joint, and the other end the prismatic-pair block sliding on the base plate by universal joint. Then, the movable platform can move with six degrees-of-freedom. The topics of kinematics and statics, and searching singular configurations for this mechanism are significant. Therefore, these project first studies the inverse kinematics followed by the static analysis of each component, and the Jacobian matrix will be derived, which is used to search singular configurations of the mechanism. Finally, many design parameters will be considered to assess their influence on the workspace in order to obtain the optimum construction of the parallel space mechanism of joint-glide type.

Keywords : parallel space mechanism of joint-glide type ; inverse kinematics ; static analysis ; searching singular configurations ; optimum construction

Table of Contents

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