On the Investigarion of Dynamics and Singularities of the Stewart Platform-type Mechanisms

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ABSTRACT

This reasearch uses a system of sixty six linear equations to describe the dynamic behavior of the Stewart Platform-type Mechanism. By means of these equations we can calculate the conditions of forces which are applied at each joint, including the values of actuator forces. By virtue of these equations, wi investigate two cases. One is to study the influence of actuator forces on ball and socket joints in the base and the platform, respectively, for different position arrangements of the joints. The other is to use the method of searching minimum value, which is one of optimization design methods, to find out the singularities of the platform- type mechanism. We solve the system of sixty-six linear equations by appro- priate procedures. Gauss elimination method will be applied for some smaller systems of linear equations during the procedures. From the results, we observe that the larger difference of the angles between the neighboring legs which are arranged symmetrically for the platform and the base, respectively, the less the scope of the actuator force will be. This will reduce the cost of the mechanism. In addition, the results of searching singularities are satisfied and may be used as an application reference.

Keywords : Stewart platform-type mechanism ; ball and socket joints ; Gauss

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