1. INTRODUCTION

1.1. Background

Spherical Parallel Mechanism is a mechanism that produces spherical motion of an output link (platform). In general term, the mechanism is composed of three kinematic chains, base and output platform. This mechanism has larger workingspace than a mechanism with the coupled motion. There are some considerations should be taking count to obtain a spherical parallel mechanism, the error of kinematic constraint, singularity problem and limited workingspace. This type of mechanism has been applied to adjust the position of the solar sensor [1].

Kinematic analysis and synthesis of 3-URU spherical parallel mechanism was reported in some researches. Discussion of the sensitivity of dimensional error and structural geometry to the precision and accuracy of output motion was studied [2]. In this research was classified the effect of kinematic error with respect to error of motion of platform rotation center and orientation on platform.

Furthermore, the research on another pure rotation parallel mechanisms is a 3-DOF RSR (Revolute-Spherical-Revolute) mechanism. Kinematic synthesis and analysis are carried out to obtain kinematic constants of the RSR kinematic structure [3]. The inverse kinematic of the mechanism was developed in this research. Inverse kinematic synthesis to perform large workingspace. In another study, there has also been studied of kinematic solutions by direct positions in mathematical equations [4], with eight pairs of configurations and a position of platform orientation.

In this research will discuss forward kinematic and singularity analysis of the 3-RSR pure rotation parallel mechanism to determine kinematic constant to yield large inclination angle of platform. On the other hand, it is also taking count the range motion of spherical joint.

1.2. Problem Formulation

In the dimensional synthesis of 3-RSR is important to taking count the displacement and singularity analysis. On the other hand, forward and inverse kinematic formulation suffer from many kinematic constraints.

1.3. Objectives

The objectives of the research are:

1. To obtain the optimal kinematic constants of 3-RSR pure rotation parallel mechanism.
2. To obtain formulation of forward kinematic 3-RSR parallel mechanism.

1.4. Outcomes

The benefit of this research is to obtain the optimum kinematic constants to produce a large workingspace considering the kinematic performances.

1.5. Problem Scopes

In this research, all links are assumed rigid and the friction occurring on the join is neglected.

1.6. Report Outlines

This research consists of five chapters, in the first chapter contains the introduction that describes the background, problem formulation, objectives, outcomes, problem scopes, and report outlines of this research. Then in the second chapter explains the literature review, which contains the basic theory used in this research. In the third chapter describes the research methodology, the summary of research stages in the form of flow charts, test design, and test procedures. Furthermore, in the fourth chapter will be explained about the results of this research. In the fifth chapter of this research is served the conclusions and suggestions of this research.