

Kinematic Analysis of a 3-RPS Parallel Manipulator using Euler Parameters

E. Yoosefi, A. Rahmani Hanzaki

Abstract

This paper presents kinematic analysis of a three-leg structure, namely, three-Revolute-Prismatic-Spherical (3-RPS) parallel manipulator using relative Euler parameters. Since, coordinates which are chosen to define orientation of platform, directly affect singularity of the manipulator, Euler parameters are utilized for this purpose. It is well-known that defining rotational motion of a moving coordinate system with respect to another using the Euler parameters causes singularity free formulation. The kinematic constraint equations are performed and solved numerically. The results are compared with the same of the manipulator simulation in ADAMS environment to validate the analysis. The algorithm is practical for dynamic modeling of the system as describe separately.

Keywords: 3-RPS; Parallel manipulator; Euler parameters; Kinematic analysis;

E. Yoosefi

Mechanical Engineering Dept., Shahid Rajaei Teacher Training University, Lavizan, Tehran, Iran,
E-mail:elahe.yosefi@gmail.com.

A. Rahmani Hanzaki (Corresponding author)

Mechanical Engineering Dept., Shahid Rajaei Teacher Training University, Lavizan, Tehran, Iran,
E-mail: a.rahmani@srttu.edu.