

## ANALYSIS FOR DYNAMICS PERFORMANCE INDICES OF 4- $\overline{RR(RR)R}$ PARALLEL MECHANISM

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Received August 2005; revised January 2006

**ABSTRACT.** *The dynamics performance of 4- $\overline{RR(RR)R}$  parallel mechanism is analyzed by virtual mechanism method and global conditioning index, which includes Jacobian matrix and Hessian matrix in this paper. Furthermore, the performance indices atlas of velocity, acceleration and inertial force are given. When the acceleration performance index is analyzed,  $\|H\|\|H^{-1}\|$  is compared with  $\|G\|\|G^{-1}\|$  in order to find out which index has the most influence on acceleration performance. At the end of the paper the 4- $\overline{RR(RR)R}$  parallel mechanism is simulated by a model designed by Matlab software.*

**Keywords:** 4- $\overline{RR(RR)R}$  parallel mechanism, Dynamics performance index, Influence coefficient matrix, Modeling simulation

1. **Introduction.** Nowadays increasing attention is paid to the parallel mechanism with lower-mobility, and the research of high-speed and high-precision robots has rapidly made progress. As we all know, the mechanism measures are very important for mechanism performance [1]. In this paper the dynamics performance indices of 4- $\overline{RR(RR)R}$  parallel mechanism with 4-DOF are analyzed first by global conditioning index, and the index includes the first-order and second-order influence coefficient matrix (Jacobian matrix and Hessian matrix). The performance indices atlas of velocity, acceleration and inertial force are drawn. When the acceleration performance is researched, owing to the particularity of the mechanism, the  $\|G\|\|G^{-1}\|$  and  $\|H\|\|H^{-1}\|$  indices, which decide the mechanism acceleration performance, are inconsistent. In order to solve the problem, the two indices are placed to the acceleration error formula. At the same time all the variables are substituted by numerical value, therefore a conclusion-the  $\|H\|\|H^{-1}\|$  index places a more important role in acceleration performance-is drawn by the acceleration error. Moreover, the correctness of the mechanism's performance and the influence coefficient matrix can be validated by a simulation model designed by use of Matlab software. Through the