Development of an equilibrium manipulator micro motion robot

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Key words: Stewart platform, Parallel manipulator, Forward kinematics, Inverse kinematics

1. 2. Simulation and experiment 가 2.1 Design and simulation 가 가 stewart platform (parallel manipulator) . 1965 Pro-ENGINEER stewart platform^{1,2} (platform) Stewart (base) 6 (actuator) . Fig. 2 \models Pro-ENGINEER 가 가 stewart platform (serial manipulator) , (c)는 Z 가 , (b) 가 가 2.2 Programming by using Visual C++ 가 , stewart platform 6 Visual C++ (degree of freedom) (closed loop) 가 가 stewart platform Visual C++ 가 가 , stewart platform 가 . Fig. 3 가 3 , Fig. 4 (forward kinematics) (inverse kinematics) (a) stewart plat-2 global form 6 link 가 Homing Newton-Raphson Homing All Homing stewart platform $\pm 1\mu m$ 가 가 Homing 가 stewart platform link jog movement Fig. 1 6 jog stewart platform (c)로 이 창 global jog movement global jog 2.3

Fig. 1 Developed stewart platform

stewart platform 가 AutoCAD Pro-ENGINEER stewart platform Visual C++

 $\pm 1 \mu m$

stewart platform

3.

PTC

(d)는

6

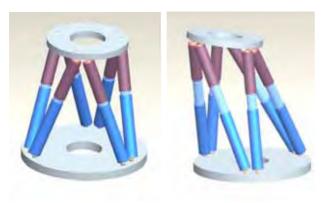
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6

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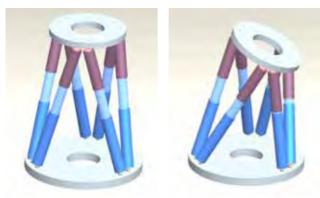
Table 1

가



(a) Original position

(b) Moves to X-axis



(c) Moves to Z-axis (c) Rotates to X-axis Fig. 2 Simulation by using Pro-ENGINEER

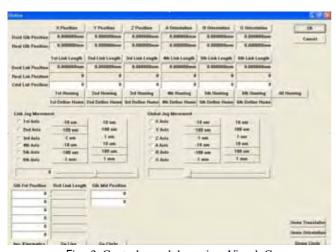


Fig. 3 Control panel by using Visual C++

	XPestion	Y Petition	Z Position	A Deletation	B Orestellion	G Orientalism	
Darid Gib Parallies	8.160000mm	0.500000mm	8.800000mm	E.300000nm	\$.200000mm	LMISSION	1 2
Real Glb Position	8.000000mm	2.90000ime	3.000000mm	A.200000mm	£380000mm	1.00000mm	
	Tot Link Leagth	2nd Link Length	Jef Link Length	an Link Length	Statisk Length	SM Link Length	
Derd Lak Position	1.000000mm	8.00000mm	8.890000am	0.800000mm	0.200000mm	8.88600mm	
Red Lak Position							
Cond Lak Pecition		- 1		1			
	Set Huming	2nd Huming	. 3rd Homing	46 Honing	56 Humley	6th Huning	All Huming
	1st Define Home	2nd Deline Hume	3rd Define Hume.	46 Delire Hater	5th Define Home	6th Deline Hume	

(a) Real position panel



(b) Link jog movement panel



(c) Global jog movement panel Fig. 4 Detailed control panel

Table 1 Technical data of developed stewart platform

사용 Motor	M230.25	Unit
Travel X.Y	±25	mm
Travel Z	±12.5	1303
Travei $\Theta_n\Theta_i$	±7.5	deg
Travel ⊕,	±15	deg
Actuator Stroke	±125	mm
Min. Incremental Motion X.Y.	1	jens
Min. Incremental Motion Z	0.5	Jane
Min Incremental Motion $\Theta_s,\Theta_s,\Theta_s$	5.	ured
Repeatability X.Y	±2	jun.
Repentability Z	±1	pm
Repeatability $\Theta_{i_1}\Theta_{i_2}\Theta$	±10	urad
Velocity X.Y.Z (typ.)	2.5	mm/sec
Velocity X.Y.Z (max.)	4	mm/sec
Velocity $\Theta_i,\Theta_j,\Theta_i$ (typ.)	25	mrad/sec
Velocity $\Theta_s \Theta_s \Theta_s$ (max.)	50	mrad/sec
Weight	13	Kg
Load capacity(vertical)	116	Kg
Load capacity(random)	10	Kg
Sine oD	280	mm
Size od	182	mm
Size H	300	mm

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