

S.V. KOSTIN, A.A. SHAMRAEV

SYNTHESIS OF THE MATH MODEL OF DELTA-ROBOT FOR USING IN TASKS OF SORTING WASTE

The problem of synthesis the kinematic models of industrial delta-robots is investigating in the article. Authors proposed universal method for solving invers task of kinematic. This method can be used for delta-robots with different quantity offaces. The developed method is oriented to using in automatic control systems of garbage sorting units. Efficiency of this method was confirmed by results of program modeling.

Keywords: delta-robot, math model, invers kinematic, industrial robot, automatic control system, waste sorting.

(. 1),



1 -

()

2].

[1,

[3],

[4]

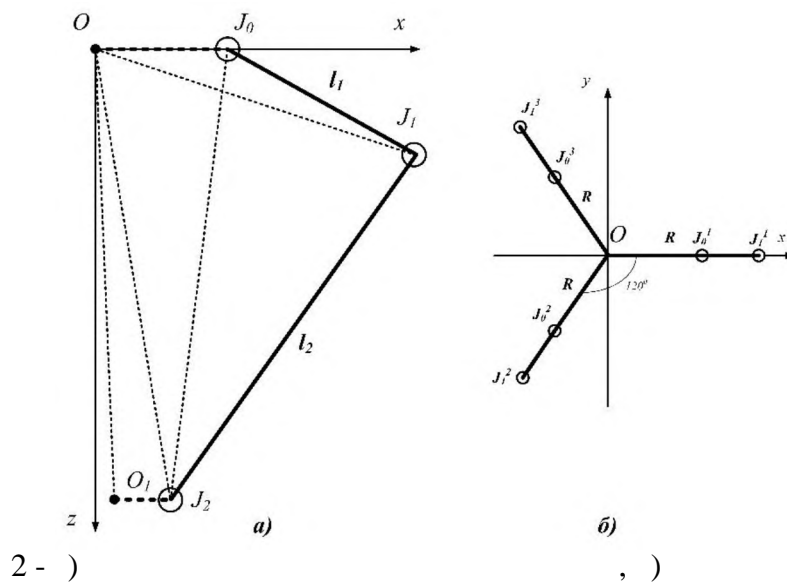
[5]

n ,
 $- O_1$, O_1
 l_1 , l_2
 (\dots) ,
 Oz , XOY ,
 Ox ,
 O .

OJ_0J_1 ,

J_0, J_1, J_2

180° .



XOY

J_0, J_1, J_2 , l_1
 OJ_0 , J_0 , R , J_0 .

rMujwjKTW

z , J_0^{12}, J_0^3 , x , Ox
 OJ_0J_2 , $OJ_0J_1, J_0J_1J_2, OJ_1J_2, OJ_2O_1$,

$$\begin{aligned} X &= R \cos(2^\wedge -), \\ &= R \sin(2^\wedge -), \\ Z &= 0, \end{aligned} \quad (1)$$

$$JOJ_qJ_2 = \arccos \left(\frac{|OJ_0|^2 + |J_0J_2|^2 - |OJ_2|^2}{2|OJ_0||J_0J_2|} \right) \quad (2)$$

(1), (2)

$$\begin{aligned} X &= R + \wedge \cos(\wedge - P) \cos(2^\wedge -), \\ &= R + \wedge \cos(\wedge -) \sin(2^\wedge -), \\ z &= \wedge \sin(-), \end{aligned} \quad (3)$$

 $l_1 -$ $J^\wedge J!$

(3),

3

K

K

rot -

$$N(K) = K(ro^\wedge + ro^\wedge + ro^\wedge + tran),$$

, tran -

B -

$$N(K) = KB, \quad (2),$$

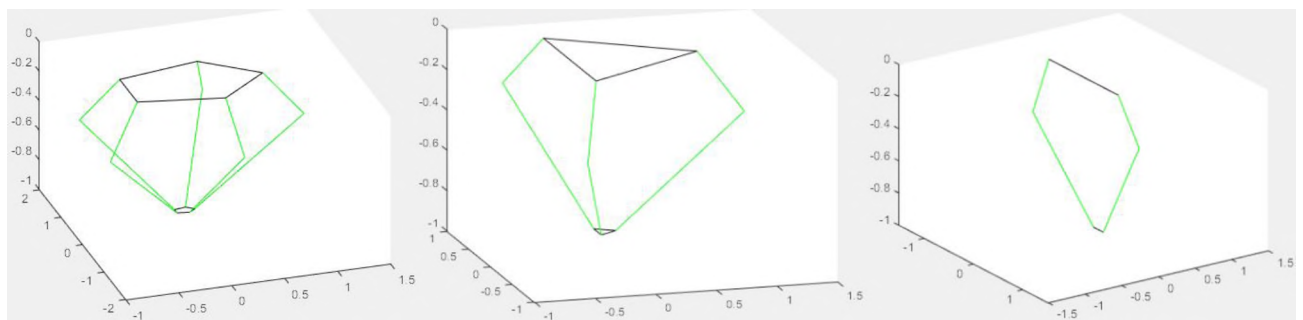
3K

[4].

7

MATLAB

3.



3 -

4

», 04 2020 15536 /2020.

1. //

2. Jha R., Chablat D., Rouillier F., Moroz G. Workspace and Singularity analysis of a Delta like family robot // Robotics and Mechatronics. Mechanisms and Machine Science. - 2016. V. 37. - P. 121-130.

3. Escobar L., Bolanos E., Bravo X., Comina M., Hidalgo J. L. Kinematic resolution of delta robot using four bar mechanism theory // IEEE International Conference on Mechatronics and Automation (ICMA). - 2015. - P. 881-887.

4. Fabian J., Monterrey C., Canahuire R. Trajectory Tracking Control of a 3 DOF Delta Robot: a PD and LQR Comparison // IEEE XXIII International Congress on Electronics, Electrical Engineering and Computing (INTERCON). 2016.

rfMujwjKTW

5. Coronado E., Maya M., Cardenas A., Guameros O., Piovesan D. Vision-based Control of a Delta Parallel Robot via Linear Camera-Space Manipulation // Journal of Intelligent & Robotic Systems. - 2017. V. 85(1). - P. 93-106.

∴ +7-961-166-80-52

E-mail: 1334425@bsu.edu.ru

∴ +7-980-393-75-01

E-mail: shamraev@bsu.edu.ru