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hz463

i	α_i	a_i	θ_i	d_i
1	$\pi/2$	0.033	$\theta_1 + \pi/2$	0.1
2	0	0.155	$\theta_2 + \pi/2$	0
3	0	0.135	θ_3	0
4	$\pi/2$	0	$\theta_4 + \pi/2$	0
5	0	0	θ_5	0

P1a

Discuss

P2a:

Following is the equation calculated by sympy:

Code is in the Jacobian.py

Matrix([[0.2175*(sin(θ1)*sin(θ2)*sin(θ3) - sin(θ1)*cos(θ2)*cos(θ3))*cos(θ4) + 0.2175*(sin(θ1)*sin(θ2)*cos(θ3) + sin(θ1)*sin(θ3)*cos(θ2))*sin(θ4) + 0.135*sin(θ1)*sin(θ2)*sin(θ3) - 0.135*sin(θ1)*cos(θ2)*cos(θ3) 0.155*sin(θ1)*cos(θ2) - 0.033*sin(θ1), 0.2175*(sin(θ2)*sin(θ3)*cos(θ1) cos(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(-sin(θ2)*cos(θ1)*cos(θ3) sin(θ3)*cos(θ1)*cos(θ2))*cos(θ4) - 0.135*sin(θ2)*cos(θ1)*cos(θ3) 0.155*sin(θ2)*cos(θ1) - 0.135*sin(θ3)*cos(θ1)*cos(θ2), 0.2175*(sin(θ2)*sin(θ3)*cos(θ1) - cos(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(sin(θ2)*cos(θ1)*cos(θ3) - sin(θ3)*cos(θ1)*cos(θ2))*cos(θ4) 0.135*sin(θ2)*cos(θ1)*cos(θ3) - 0.135*sin(θ3)*cos(θ1)*cos(θ2), 0.2175*(sin(θ2)*sin(θ3)*cos(θ1) + cos(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(sin(θ2)*cos(θ1)*cos(θ3) - sin(θ3)*cos(θ1)*cos(θ2))*cos(θ4)], [0.2175*(sin(θ2)*sin(θ3)*cos(θ1) + cos(θ1)*cos(θ2)*cos(θ3))*cos(θ4) + 0.2175*(sin(θ2)*cos(θ1)*cos(θ3) - sin(θ3)*cos(θ1)*cos(θ2))*sin(θ4) 0.135*sin(θ2)*sin(θ3)*cos(θ1) + 0.135*cos(θ1)*cos(θ2)*cos(θ3) + 0.155*cos(θ1)*cos(θ2) + 0.033*cos(θ1), 0.2175*(sin(θ1)*sin(θ2)*sin(θ3) sin(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(-sin(θ1)*sin(θ2)*cos(θ3) sin(θ1)*sin(θ3)*cos(θ2))*cos(θ4) - 0.135*sin(θ1)*sin(θ2)*cos(θ3) 0.155*sin(θ1)*sin(θ2) - 0.135*sin(θ1)*sin(θ3)*cos(θ2), 0.2175*(sin(θ1)*sin(θ2)*sin(θ3) - sin(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(sin(θ1)*sin(θ2)*cos(θ3) - sin(θ1)*sin(θ3)*cos(θ2))*cos(θ4) 0.135*sin(θ1)*sin(θ2)*cos(θ3) - 0.135*sin(θ1)*sin(θ3)*cos(θ2), 0.2175*(sin(θ1)*sin(θ2)*sin(θ3) + sin(θ1)*cos(θ2)*cos(θ3))*sin(θ4) + 0.2175*(sin(θ1)*sin(θ2)*cos(θ3) - sin(θ1)*sin(θ3)*cos(θ2))*cos(θ4)], [0, 0.2175*(sin(θ2)*sin(θ3) + cos(θ2)*cos(θ3))*cos(θ4) + 0.2175*(-sin(θ2)*cos(θ3) sin(θ3)*cos(θ2))*sin(θ4) - 0.135*sin(θ2)*sin(θ3) + 0.135*cos(θ2)*cos(θ3) + 0.155*cos(θ2), 0.2175*(-sin(θ2)*sin(θ3) + cos(θ2)*cos(θ3))*cos(θ4) + 0.2175*(sin(θ2)*cos(θ3) - sin(θ3)*cos(θ2))*sin(θ4) - 0.135*sin(θ2)*sin(θ3) +

0.135*cos(θ2)*cos(θ3), 0.2175*(-sin(θ2)*sin(θ3) + cos(θ2)*cos(θ3))*cos(θ4) 0.2175*(sin(θ2)*cos(θ3) + sin(θ3)*cos(θ2))*sin(θ4)], [0, 0, 0, 0]])