**DH Parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| I | a |  |  |  |
| 1 | 0 | 0 |  |  |
| 2 |  |  | 0 |  |
| 3 |  | 0 | 0 |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |

Where ; ; ; ;

; .

So that we can calculate all five separate transform matrices.

Jacobian according to the tool frame

5

Jacobian according to the base frame

(This Jacobian matrix cannot be written here elegantly. So that we just used Matlab codes to show how we calculated this matrix in the appendix)

6

Analytical Jacobian

(Analytical Jacobian matrix cannot be written here elegantly. So that we just used Matlab codes to show how we calculated this matrix in the appendix)

A