

```

1 %FK
2 syms th1 th2
3 a1 = 3;
4 a2 = 5;
5 L1 = Link([0,a1,0,0]);
6 L2 = Link([0,a2,0,0]);
7 R = robot({L1 L2});
8 R.name = '2 Links';
9 qz1 = [0 0];
10 T = fkine(R,qz1);
11 qz2 = [pi/6 -pi/3];
12 T2 = fkine(R,qz2);
13 plot(R,qz2)
14
15
16

```

Narong Aphiratsakun, D.Eng

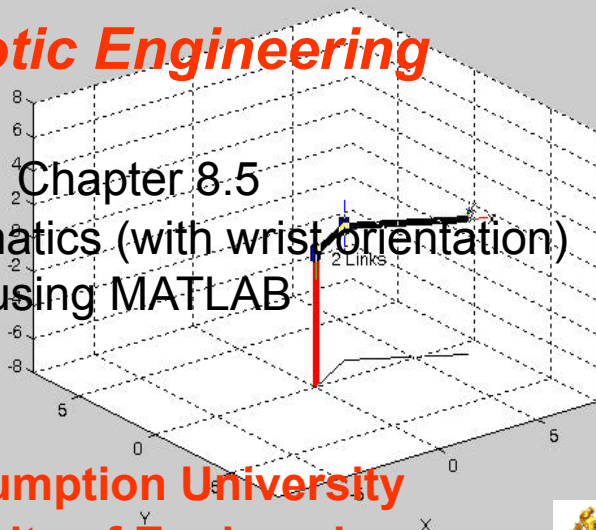
Figure 1

MCE4101

Robotic Engineering

Chapter 8.5

Inverse Kinematics (with wrist orientation)  
using MATLAB



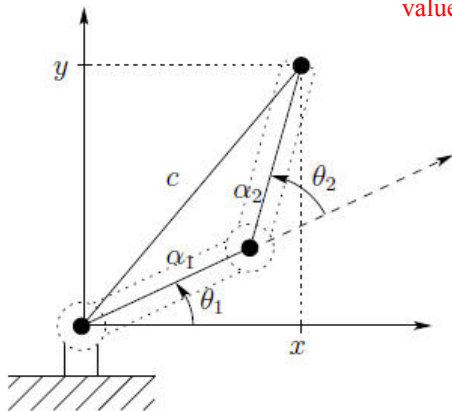
Assumption University  
Faculty of Engineering



# IK : 2 Links using MATLAB



Ex: Let  $\alpha_1 = 3$  and  $\alpha_2 = 5$ , obtain the possible values of  $\theta_1$  and  $\theta_2$  for point(7.5,2).



Link	$a_i$	$\alpha_i$	$d_i$	$\theta_i$
1	$a_1$	0	0	$\theta_1^*$
2	$a_2$	0	0	$\theta_2^*$

# IK : 2 Links using MATLAB



1 New to MATLAB? Watch this [Video](#), see [Demos](#), or read [Getting Started](#).

Q\_deg =

33.1022 -28.9550

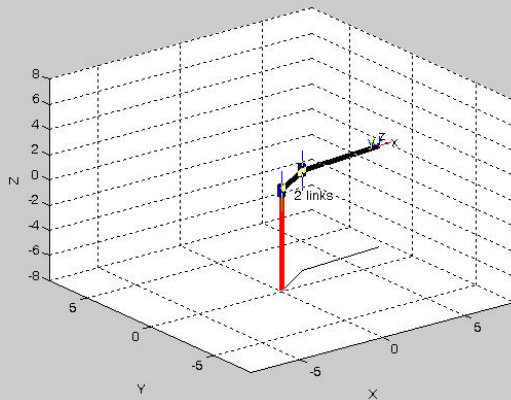
Editor - C:\Documents and Settings\Wott\My Documents\IK\_2.m

File Edit Text Go Cell Tools Debug Desktop Window Help

1 %IK of 2 links then plot with FK  
2 clc;  
3 clear all;  
4 syms th1 th2  
5 a1 = 3;  
6 a2 = 5;  
7 L1 = Link([0,a1,0,0]);  
8 L2 = Link([0,a2,0,0]);  
9 R = robot({L1 L2});  
10 position = transl(7.5,2,0);  
11 Q = ikine(R, position, [0 0], [1 1 0 0 0 0]);  
12 Q\_deg = (Q/pi)\*180  
13 R.name = '2 links';  
14 plot(R,Q);  
15  
16

Figure 1

File Edit View Insert Tools Desktop Window Help



# IK : 2 Links using MATLAB



Q\_deg =

-3.2394    28.9550

Editor - C:\Documents and Settings\Nott\My Documents\IK\_2.m

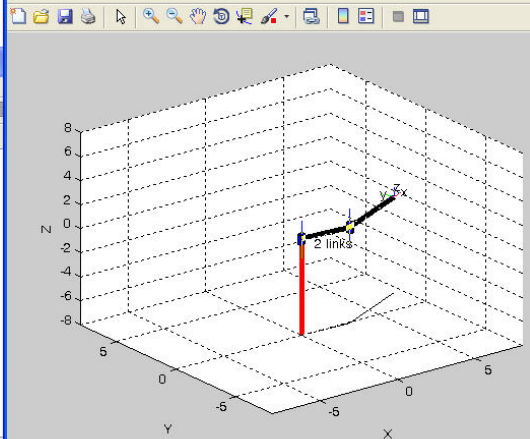
File Edit Text Go Cell Tools Debug Desktop Window Help

```
1 %IK of 2 links then plot with FK
2 clc;
3 clear all;
4 syms th1 th2
5 a1 = 3;
6 a2 = 5;
7 L1 = Link([0,a1,0,0]);
8 L2 = Link([0,a2,0,0]);
9 R = robot([L1 L2]);
10 position = transl(7.5,2,0);
11 Q = ikine(R, position, [-pi/20 pi/20], [1 1 0 0 0 0]);
12 Q_deg = (Q/pi)*180
13 R.name = '2 links';
14 plot(R,Q);
15
16
```

script

Figure 1

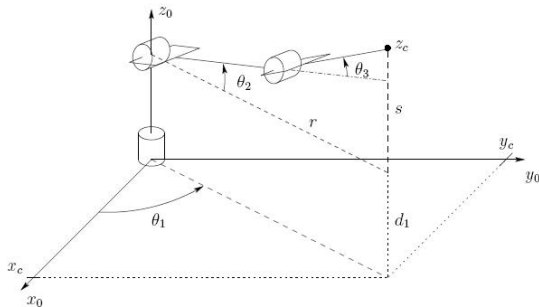
File Edit View Insert Tools Desktop Window Help



# IK : RRR using MATLAB



## RRR

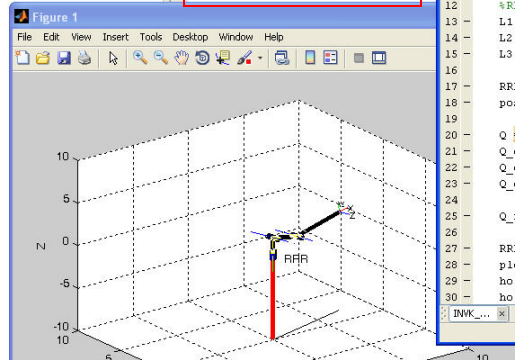
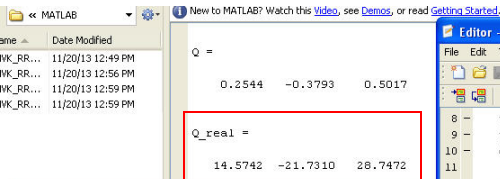


Link	$a_i$	$\alpha_i$	$d_i$	$\theta_i$
1	0	90	$d_1$	$\theta_1^*$
2	$a_2$	0	0	$\theta_2^*$
3	$a_3$	0	0	$\theta_3^*$

RRR with no offset configuration.

Let  $\alpha_2 = 3$  and  $\alpha_3 = 5$   $d_1 = 2$ , obtain the possible values of  $\theta_1$ ,  $\theta_2$  and  $\theta_3$  for point (7.75, 1.95, 1.5).

# IK : RRR using MATLAB



```
Editor - C:\Documents and Settings\Wott\My Documents\INVK_RRR.m  
File Edit Text Go Cell Tools Debug Desktop Window Help  
- 1.0 + ÷ 1.1 x  
8 - th2 = 0;  
9 - th3 = 0;  
10 - d1 = 2;  
11  
12 %RRR  
13 - L1 = Link([pi/2,0,th1,d1]);  
14 - L2 = Link([0,a2,th2,0]);  
15 - L3 = Link([0,a3,th3,0]);  
16  
17 RRR = robot({L1 L2 L3});  
18 pos = transl(7.5,1.95,1.5);  
19  
20 Q = ikine(RRR, pos,[pi/10 0 0],[1 1 1 0 0 0])  
21 Q_deg(1,1) = (Q(1,1)/pi)*180;  
22 Q_deg(1,2) = (Q(1,2)/pi)*180;  
23 Q_deg(1,3) = (Q(1,3)/pi)*180;  
24  
25 Q_real = [Q_deg(1,1) Q_deg(1,2) Q_deg(1,3)]  
26  
27 RRR.name = 'RRR';  
28 plot(RRR,Q);  
29 hold on;  
30 hold off;  
INVK... x FK_RR... x  
script Ln 34 Col 8 OVR
```