INVKIN

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Escreve uma função para calcular a cinemática inversa para o manipulador RRR planar

Calling Syntax

```
[near,far,sol] = invkin(wrelb,current,L,thetalim)
```

I/O Variables

```
|IN Double Matrix| *wrelb*: W rel to B  Homogeneous Transformation
Matrix 4x4
|IN Double Array| *current*: joint angle degrees  [theta1 theta2 theta3]
[degrees degrees degrees]
|IN Double Array| *L*: link lenghts  [L1 L2 L3] [meters meters meters]
|IN Double Array| *thetalim*: Matrix of joint limits in degrees

|OU Double Array| *near*: Homogeneous Transformation Matrix 4x4
|OU Double Array| *far*: Homogeneous Transformation Matrix 4x4
|OU Bool| *sol*: boolean represent solution existence
```

Example

```
L = [0.5 0.3];
current = [45 30 -10];
thetalim = [-170 170;-170 170;-170 170];
wrelb = kin([20,30,40],L);
[near,far,sol] = invkin(wrelb,current,L,thetalim);
```

Hypothesis

RRR planar robot.

Limitations

Function

```
function [near,far,sol] = invkin(wrelb,current,L,thetalim)
```

Validity

Main Calculations

```
    sol = 0;
    coord = itou(wrelb);
    c2 = (coord(1)^2 + coord(2)^2 - L(1)^2 - L(2)^2)/(2*L(1)*L(2));
    coord(3) =  coord(3)*pi()/180;
    s2 = [sqrt(abs(1-c2^2)) -sqrt(abs(1-c2^2))];
    k1 = L(1) + L(2)*c2;
    k2 = L(2)*s2;
    gamma = atan2(k2,k1);
    theta2 = atan2(s2,c2);
    theta1 = atan2(coord(2),coord(1)) - gamma;
    theta3 = coord(3) - theta1 - theta2;
    theta1 = theta1*180/pi();
    theta2 = theta2*180/pi();
    theta3 = theta3*180/pi();
    if thetalim(1,1) < theta1(1) && theta1(1) < thetalim(1,2)
        if thetalim(2,1) < theta2(1) && theta2(1) < thetalim(2,2)
            if thetalim(3,1) < theta3(1) && theta3(1) < thetalim(3,2)
                sol = 1;
            end
        end
    end
    if thetalim(1,1) < theta1(2) && theta1(2) < thetalim(1,2)
        if thetalim(2,1) < theta2(2) && theta2(2) < thetalim(2,2)
            if thetalim(3,1) < theta3(2) && theta3(2) < thetalim(3,2)
                sol = 1;
            end
        end
    end
    if abs(current(1) - theta1(1)) > abs(current(1) - theta1(2))
        near = [theta1(2) theta2(2) theta3(2)];
        far = [theta1(1) theta2(1) theta3(1)];
    else
        near = [theta1(1) theta2(1) theta3(1)];
        far = [theta1(2) theta2(2) theta3(2)];
    end

end
```

```
near =
   42.3353  -30.0000   77.6647


far =

   20.0000   30.0000   40.0000


sol =

     1
```

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