1 Space description

Position

Once the coordinate system is established, we can locate any point in the world coordinate system with a position vector of 3x1. Since many coordinates areoften defined in the world coordinate system, a piece of information must beattached to the position vector indicating which coordinate system is defined.In this book, the position vector has a leading superscript to indicate thecoordinate system to which it refers.

Posture

We find that it is often necessary not only to represent points in space, but also to describe the posture of objects in space. For example, if the vector "P" in Figure 2-2 directly determines a point between the fingers of the manipulator hand, the position of the hand can only be fully determined if the posture of the hand is known. Assuming that the manipulator has a sufficient number of joints, the manipulator can be in any position and the position of the points between the fingers remains constant. To describe the posture of an object, we will fix a coordinate system on the object and give the representation of this coordinate system with respect to the reference system. In Figure 2-2, the coordinate system {B} is known to be fixed to the object in some way. The description in {B} relative to {A} is sufficient to indicate the attitude of object (A).

Coordinate System

A reference frame can be described in terms of the relation of one coordinate system with respect to another. The reference frame includes the concepts of position and posture, which is considered to be a combination of these two concepts in most cases. The position can be represented by a frame of reference in which the rotation matrix is the identity matrix and the position vector in this frame of reference determines the position of the described point. Similarly, if the position vector in the frame of reference is the zero vector, then it represents the posture.

2 DH Parameters

Definition

For rotational joint n, set 0=0.0, the direction of X axis is the same as that of X, axis, the origin position of coordinate system (n) is selected to satisfy d.=0.0.For prismatic joint n, the direction of axis 8 is set to meet 0.=0.0. When d.=0.0, the origin of the coordinate system {n) is selected to be located at the intersection of axis XN-1 and joint axis n.

In the link coordinate system, if the link coordinate system is fixedly attached to the link as described above, the link parameters can be defined as follows:

- a_i-1 ： along x_i-1 : move from the distance of z_i-1 to z_i
- alpha_i-1 ： aroundx_i-1 ： rotate from the Angle of z_i-1 to z_i
- d_i ： along z_i ： move from the distance of x_i-1 to x_i
- theta_i ： aroundz_i ： rotate from the Angle of x_i-1 tox_i

myCobot DH parameter

Joint	alpha	a	d	theta	offset
1	0	0	131.56	theta_1	0
2	PI/2	0	0	theta_2	-PI/2
3	0	-110.4	0	theta_3	0
4	0	-96	64.62	theta_4	-PI/2
5	PI/2	0	73.18	theta_5	PI/2
6	-PI/2	0	48.6	theta_6	0