**Cubic Polynomials for a path with intermediate point**

In the case of single goal point, each via point is usually specified in terms of desired position and orientation of the robot. We consider the problem of computing cubic that connect the via point values for each segment in a smooth way. If desire velocities of the robot at the via points are known, then we can construct cubic polynomials as before, velocity constrains at each end are not zero, but rather have some known velocity. The constrains become:

So,

After solving the equation, we get

For the coefficient of two cubic that are connected in a two-segment spline with continuous acceleration at the intermediate via point. The initial angle is the via point is, and the goal point is .

The first cubic is

And the second is

Each cubic will be evaluated over an interval starting at t = 0 and ending at t= where i = 1 or i = 2.

We consider that = =, we obtain