**Three-Dimensional Position, Velocity, Acceleration Solutions**

**Position**

given  and 





**Velocity**

given  and 

 



**Partial derivatives**

 

**Acceleration**

given  and 

 



**Kinematically driven motion**

1.0 Initialize

 1.1 constants

 1.2 global locations of fixed points 

 1.3 local blueprint locations 

2.0 Initial estimates

 2.1 global locations of origins 

 2.2 Euler parameters 

 2.3 assemble into

3.0 Explicit time loop

4.0 Position solution

 4.1 rip new values for  and  from 

 4.2 form attitude information 

 4.3 compute global locations for all points 

 4.4 extract  for fixed revolute rotation drvier from 

 4.5 evaluate constraints 

 4.6 assemble all position constraints

 4.7 evaluate partial derivatives 

 4.8 assemble Jacobian

 

 4.9 Newton-Raphson update 

 4.10 check convergence - repeat 4.1 through 4.9 if needed

5.0 Euler parameter velocity solution

 5.1 evaluate 

 5.2 assemble 

 5.3 compute  for 

 5.4 determine  and form 

6.0 Euler parameter acceleration solution

 6.1 evaluate 

 6.2 assemble 

 6.3 compute  for 

 6.4 determine  and form 

7.0 ALTERNATE - Local angular velocity solution

 7.1 use same 

 7.2 assemble  (do not need )

 7.3 use same 

 7.4 assemble  for 

 7.5 compute  derivatives 

 7.6 assemble  for 

 7.7 use 

 7.8 compute 

8.0 ALTERNATE - Local angular acceleration solution

 8.1 use same 

 8.2 assemble  (do not need )

 8.3 use  for  

 8.4 compute 