

Constraint Jacobians for Constant-Time Inverse Kinematics and Assembly Optimization

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Abstract

An algorithm for the constant-time solution of systems of geometric constraint equations is presented in this work. Constraint equations and their Jacobians may be used in conjunction with other numerical methods to solve for a variety of kinematics, dynamics, and assembly optimization problems. The use of constraint equations for these purpose is an under-utilized method in this area. The use of quaternions for coordinates in these constraint equations is shown to be a key choice in the optimization problem for avoiding local minima.