1050-57-159 **Li Han*** (lhan@clarku.edu), 950 Main Street, Worcester, MA 01610, and **Lee Rudolph**.

Simplex-Tree Based Kinematics of Foldable Objects as Multi-body Systems Involving Loops.

Many practical multi-body systems involve loops. Studying the kinematics of such systems has been challenging, partly because of the requirement of maintaining loop closure constraints, which have conventionally been formulated as highly nonlinear equations in joint parameters. In earlier work, we introduced parameters defined by trees of triangles for a broad class of linkage systems involving loops (such as, for instance, spatial loops with spherical joints and planar loops with revolute joints); these parameters greatly simplify kinematics related computations and endow system configuration spaces with highly tractable piecewise convex geometries. More recently, we have developed a more general approach for those multi-body systems (many of them with loops) that allow *construction trees of simplices*. We will illustrate the applicability and efficiency of our simplex-tree based approach to the kinematics of foldable objects by a study of single-vertex rigid folds. (Received March 03, 2009)