

On two open kinematic problems

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Abstract: Two small kinematic problems are presented whose complete solution is an open problem. The first concerns so called Möbius linkages. Möbius linkages are n -axes closed kinematic chains in which the axes form a discrete Möbius strip. It was conjectured by previous papers that in some limit cases these linkages have less degrees of freedom than one would expect by their number of joints. Up to now there is no formal proof for this property. The limit angles for 7R, 8R and 9R Möbius linkages are derived, the pathological degree of freedom will be discussed and some interesting kinematic features of these linkages are presented. The second problem concerns coincident solutions of direct kinematics of planar 3-RPR parallel devices. It is well known that the direct kinematics of planar 3-RPR parallel manipulators has six solutions. Conditions for multiple solutions are derived and linked to the notions of shakiness and flexes of these mechanisms existing in the literature. This problem is also closely related to maximal tangency of four bar coupler curves. It turns out that symmetric cases can be solved completely but the general case is an open problem.