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Alexandrov, Victor, Sobolev Institute of Mathematics, Novosibirsk, Russia

Sufficient conditions for the extendibility of an N-th order flex of polyhedra

A very long-standing (and still open) problem is to prove that a smooth compact surface in the Euclidean 3-space is rigid. Classical attempts to solve this problem were based on the notion of an infinitesimal flex. Since a counterexample was constructed by R. Connelly in the class of polyhedral surfaces, particular attention was given to studying infinitesimal flexes of polyhedra.

We give a new approach to describing a high order flex of polyhedra. The main results provide some sufficient conditions under which an infinitesimal flex of a polyhedron can be extended to an authentic flex. We discuss also results of computer experiments demonstrating that one set of our sufficient conditions is fulfilled for Bricard octahedra.