This paper presents a motion control strategy for a rigid and constraint consistent formation that can be modeled by a directed graph whose each vertex represents individual agent kinematics and each of directed edges represents distance constraints maintained by an agent, called follower, to its neighbouring agents. A rigid and constraint consistent graph is called persistent graph. A persistent graph is minimally persistent if it is persistent and no edge can be removed without losing its persistence. An acyclic (free of cycles in its sensing pattern) minimally persistent graph of Leader-Follower structure has been considered here and which can be constructed from an initial Leader-Follower seed (initial graph with two vertices, one is Leader and another one is First Follower and one edge in between them is directed towards Leader) by Henneberg sequence (a procedure of growing a graph) containing only vertex additions. A set of nonlinear optimization based decentralized
control laws for mobile autonomous point agents in plane have been proposed. An infinitesimal deviation in formation shape created by continuous motion of Leader is compensated by corresponding continuous motion of other agents fulfilling the shortest path criteria.

Reference

Formations of Multi-Robot Networks", International Journal of Control, Volume 82, Number 3, March 2009, pp. 423-439(17)


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