ABSTRACT OPTIMIZATION 2011

Optimal Switching of Agent Formations with Collision Avoidance and Allowing Variable Path Curvatures.

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In this work, we address the problem of dynamically switching the topology of a formation of a number of undistinguishable agents. The need to switch formation topology arises in situations when mission requirements change or there are obstacles or boundaries along the formation path that are inadequate for the current topology. Here we propose a strategy to determine which agent should go to each of the new target positions, avoiding collisions among agents and assuming no agent communication. In addition, each agent can also modify its path by changing its curvature, which is a main distinguishing feature from previous work. Among all possible solutions we seek one that minimizes the total formation switching time, i.e. that minimizes the maximum time required by all agents to reach their positions in the new formation topology. We describe an algorithm based on dynamic recursion to solve this problem and provide some examples.