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Full paper

Robot Navigation Based on Discrimination of Artificial Fields: Application to Robot Formations

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Abstract

In the preceding paper, a method for mobile robot navigation control based on discrimination of multiple artificial fields was introduced. In this second paper, the method is extended to robot formations. Experimental demonstrations are presented taking examples of four types of formations. The experiments cover formation initialization, maneuvering, obstacle avoidance and formation switching.

Keywords

Mobile robot navigation, virtual potential fields, robot formations

1. Introduction

The preceding paper proposes a navigation method based on discrimination of artificial fields, with application examples concerning single robots. In this paper, the method is extended to robot formations. A large part of the paper is devoted to experimental demonstrations. The experiments include formation initialization, maneuvring, obstacle avoidance and formation switching using four different formation shapes.

The literature review in the first paper is now extended for robot formations, focusing on behavior-based approaches using potentials. There is a significant research activity on groups of robots, with many interesting aspects [1]. Reference [2] studies the basic case of two robots that avoid obstacles while maintaining formation geometry; the paper includes an extensive review. Reference [3] proposes a hybrid fuzzy control for multiple robots based on obstacle avoidance and wall-following behaviors.

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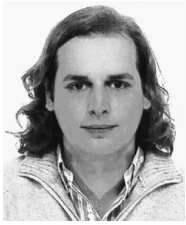

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