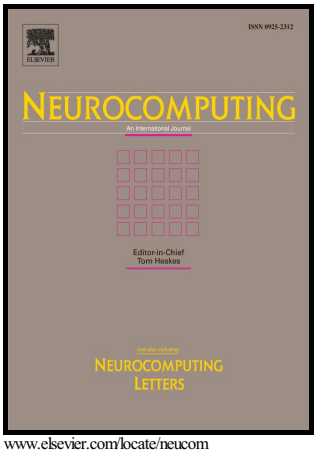

Adaptive flocking of heterogeneous multi-agents systems with nonlinear dynamics

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PII: S0925-2312(16)30747-0
DOI: http://dx.doi.org/10.1016/j.neucom.2016.06.064
Reference: NEUCOM17359

To appear in: *Neurocomputing*

Received date: 21 November 2015
Revised date: 17 February 2016
Accepted date: 28 June 2016

Cite this article as: Qing Zhang, Yaru Hao, Zhengquan Yang and Zengqiang Chen, Adaptive flocking of heterogeneous multi-agents systems with nonlinear dynamics, *Neurocomputing,* http://dx.doi.org/10.1016/j.neucom.2016.06.064

ADAPTIVE FLOCKING OF HETEROGENEOUS MULTI-AGENTS SYSTEMS WITH NONLINEAR DYNAMICS

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Abstract: This paper investigates the flocking problem for a set of heterogeneous multi-agent systems which composed of two kinds of agents differed by their dynamics. Under some assumptions, an adaptive controllers and update laws are designed for the heterogeneous multi-agents. Then, according to the Lyapunov stability theory, it is proved that the velocities of each agent come to be the same asymptotically and avoidance of collisions between the agents is ensured. A simulation example is finally provided to illustrate the effectiveness of the proposed scheme .

Keywords: Flocking, Adaptive flocking , Heterogeneous Multi-agents, Nonlinear dynamic , Adaptive control

1. INTRODUCTION

As one of the most representative collective behaviors of multi-agent systems, flocking, which means that a bunch of agents, using only limited environment information and some simple regulations , organise into a coordinated motion. Flocking behaviour of multi-agents has attracted considerable attention in recent years from various research communities , such as ecology, evolutionary biology , statistical physics and computer graphics , automatic control , etc.

There are a great quantity of contribution to the work of the flocking. Related problems exist in nature in the form of cloning of ants, schooling of fish, swarming of bacteria, hiving of honey bees, flocking of birds and so on [1-3]. In 1986, Reynolds[4] introduced three heuristic rules that led to rendezvous of the first computer animation of flocking. Since then, Vicsek et. al [5] proposed a simple flocking model of multi-agents all moving with the same speed but with different directions in the plane. Based on the algebraic graph theory, Jadbabaie et. al[6] gave the rigorous proof of the convergence behavior