

Flight Formation Control

Edited by
José A. Guerrero
Rogelio Lozano



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Chapter 1

Introduction

1.1. Motivation

Multiple spacecraft/aircraft flight formation and coordination control are topics that have received a lot of attention over the past decades. Also, the new developments powered by technological advances have spurred a broad interest in autonomous vehicles. The explosion in computation and communication capabilities as well as the advent of miniaturization technologies has increased the interest in a wide variety of research communities, including robotics, communications, automatic control, etc. On the one hand, cooperative and coordinated behavior of a group of unmanned aerial vehicles can cover a larger operational area than a single autonomous vehicle. On the other hand, the lifting of heavy and/or large structures, underway replenishment (fuel, munitions, goods, and personal transfer from one ship to another while under way) and aerial refueling are operations in which coordination is highly required. Thus, the main motivation of this work can be found in the wide variety of applications of multiautonomous vehicle systems such as in the following examples:

Formation flying have been used in survey operations, homeland security, etc. During World War II the groups of B-17 bombers used to fly in a close formation and be escorted by P-51 Mustang fighters also flying in formation to gain better protection as a group. Piloting for many hours in a close formation and under the enemy fire has been proven to be tiring and stressful. Current fighters and bombers fly much faster than those during WWII which may increase the stress and induce nerve-racking