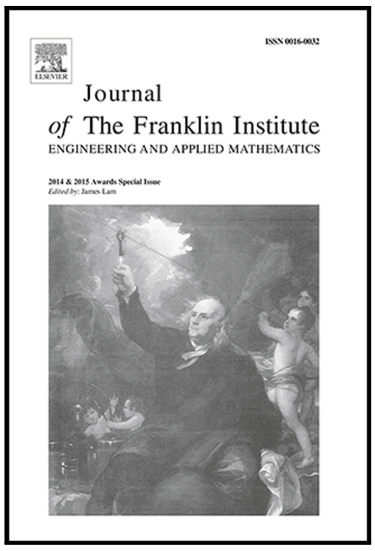

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Distributed Cooperative Controller Design Considering Guidance Loop and Impact Angle

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Abstract

This paper presents an integrated distributed cooperative guidance and control scheme for multiple missiles to attack a single target simultaneously at desired impact angles. The scheme is divided into two parts: individual part and cooperative part. For the individual part, partial integrated guidance and control method is adopted to generate the elevator deflection (which is a realistic control input) to ensure that the missiles fly along their respective desired line of sight and hit the target; this is in contrast to previous works which analyze only the engagement dynamics and use missile accelerations as the control input, however, the proposed controller also considers the missile dynamics, thus enabling the implementation of an autopilot. For the cooperative part, using only information from adjacent missiles, the proposed distributed cooperative controller can make all missiles hit the target simultaneously. Hence in this scheme, each missile can hit the target at desired angles and at the same time, thus achieving salvo attack. Simulations are performed to verify the effectiveness of the scheme.

Keywords:
distributed cooperative guidance, partial integrated guidance and control, impact angle, impact time

1. Introduction

In modern warfare, as anti-missile defense systems are developed, it is challenging for a single missile to destroy a large target equipped with such systems. A possible method to overcome such systems is for multiple missiles to simultaneously attack from various directions [1]. Simultaneous attack of a group of missiles against a single common target can be achieved in two ways. The first approach is *individual*