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Editorial

Special Issue on "Intelligent Autonomous Decision-Making and Cooperative Control Technology of High-Speed Vehicle Swarms"

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Swarm intelligence technology is a high and new technology combining unmanned system technology, network information technology and artificial intelligence technology, which has become a research hotspot. The characteristics of high-speed and high dynamic flight, large airspace flight environment and multi-field coupling battlefields under strong confrontation bring great challenges to the cooperative operation of high-speed vehicle swarms.

Due to the high speed and high dynamic flight characteristics, as well as the large airspace flight environment, the fluid–thermal–structural coupling effect makes it difficult for the traditional UAV swarm technology to be directly applied to the high-speed aircraft swarm system, which brings great challenges to its decision making and planning. Therefore, it is urgent to study new theories and methods for the cooperative decision making and mission planning of high-speed aircraft swarm systems.

This Special Issue, "Intelligent autonomous decision-making and cooperative control technology of high-speed vehicle swarms", has been launched to provide an opportunity for researchers in the area of collaborative decision-making and mission-planning technology for high-speed aircraft swarms to highlight recent developments made in their fields. Eight excellent papers that cover a wide variety of characteristic analysis and parameter optimization method for hypersonic vehicle/fully distributed control/multi-constraints cooperative guidance method/formation control technology aspects were selected for publication in this Special Issue [1–7]. These eights papers have been summarized as follows:

- Li et al. [1] proposes a parameter-optimization method for air-breathing hypersonic vehicle. Their method uses a neural network to model the relationship between the aircraft parameters and optimal cruise point and can provide good guidance for the adjustment of aircraft parameters.
- Cong et al. [2] studies a multi-constraints cooperative guidance method based on distributed MPC for multi-missiles. The method can simultaneously control multiple missiles to perform attacks on the target with the constraints of impact time and impact angle on the premise of meeting the requirements of miss distance.
- Liu et al. [3] proposes a novel distributed consensus method for MAS with completely unknown system nonlinearities and time-varying control coefficients under a directed graph. It is rigorously proved that the consensus of the MAS is achieved while guaranteeing the prescribed tracking-error performance.
- Suo et al. [4] proposes a route-based formation switching and obstacle avoidance method for the formation control problem of fixed-wing UAVs in distributed ad hoc networks. The results shows that the method is helpful to deal with the communication anomalies and flight anomalies with variable topology.
- Qin et al. [5] proposes a distributed grouping cooperative dynamic task assignment method based on extended contract network protocol. The method can perform reconnaissance-and-attack tasks to multi-targets in complex and uncertain combat

scenarios, improve the adaptiveness of the swarm under the sudden circumstance, and realize the optimization of the task execution efficiency of the UAV swarm.

- Luo et al. [6] proposes a UAV-cooperative penetration dynamic-tracking interceptor method based on DDPG, which can realize the time coordination of multi-UAV cooperative penetration.
- Zhang et al. [7] investigates the air–ground cooperative time-varying formation-tracking control problem of a heterogeneous cluster system composed of a UGV and a UAV. Using a linear quadratic optimal control theory, a UAV–UGV formation–maintenance controller is designed to track the reference trajectory of the UGV based on the UAV–UGV relative motion model.

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