# 2026 第九届 IEEE 国际无人系统大会
# 特邀专题简介表

**特邀专题名称**

无人集群系统自主化协同控制

**组织者**

1. 王庆，助理教授，北京航空航天大学

2. 化永朝，副教授，北京航空航天大学

3. 董希旺，教授，北京航空航天大学

**个人简介**

**王庆**，北京航空航天大学助理教授，2024 年 6 月博士毕业北京航空航天大学自动化与电气工程学院 导航、制导与控制专业，研究方向为：无人集群系统协同控制与博弈，于 2024 年 6 月入选中国博士后创新人才计划，在相关领域发表学术论文 30 余篇，其中以第一作者/通讯作者身份发表在 Automatica、IEEE 汇刊上发表学术论文 15 篇。受理或授权发明专利 5 项，软件著作权 3 项。以技术骨干与项目负责人身份参与或主持包括科技部 2030-新一代人工智能重大项目、军事智能研究基金等在内科研项目 10 余项，担任中国指挥与控制学会集群智能与协同控制专委会副总干事、中国指挥与控制学会青年工作委员会委员。先后获得中国指挥与控制学会优秀博士论文奖、北京自动化学会优秀博士生等奖励。

**化永朝**，北京航空航天大学人工智能学院副教授，入选中国科协青年人才托举工程、小米青年学者。主要从事集群智能与协同控制研究，主持国家自然科学基金、北京市自然科学基金、国防重点项目课题等 10 余项，在 IEEE TAC、Automatica 等学术期刊上发表 SCI 论文 20 余篇，出版 Taylor & Francis 英文专著 1 部；曾获中国自动化学会自然科学奖一等奖、中国指挥与控制学会科技进步奖一等奖、吴文俊人工智能优秀青年奖、空军“无人争锋”比赛冠军等；担任中国指挥与控制学会青工委副总干事、集群智能与协同控制专委会委员等。

**董希旺**，北京航空航天大学蓝天杰出教授（二级）、博士生导师，北京航空航天大学无人系统研究院院长、中国航空工业集团公司沈阳飞机设计研究所人工智能领域专业副总师、中国指挥与控制学会副秘书长，国家级领军型人才、工信部杰青、北京市杰青、国家优青。长期从事集群智能、协同制导控制、协同决策规划及飞行器集群等研究，理论与实践并重，研发了基于无人机和无人车的集群智能协同验证平台并开展了系列试验验证，支撑完成三届无人争锋比赛无人机集群极速穿越飞行任务均获得最好成绩，蝉联固定翼集群科目冠军。以第一和通讯作者在 IEEE TAC 和 TCST 等汇刊以及 Automatica 等国际知名期刊发表 SCI 论文 100 余篇，累计 SCI 他引 5000 余次，长期入选爱思唯尔中国高被引学者和全球前 2%顶尖科学家，在科学出版社、Springer 和 Taylor Francis 等出版中英文专著 5 部，授权/受理国家发明专利 80 余项。先后获得中国自动化学会自然奖一等奖，中国指挥与控制学会技术发明一等奖、科技进步一等奖、创新奖一等奖、青年科学家奖，中国发明协会技术发明一等奖，吴文俊人工智能优秀青年奖等奖励和荣誉。担任 IEEE Transactions on Cybernetics、IEEE Robotics and Automation Letters、Unmanned Systems 等多个国际知名期刊编委，以及《指挥与控制学报》、《现代防御技术》、《导航定位与授时》、《航空兵器》、《航天控制》、《宇航学报》等多个行业旗舰期刊副主编或编委。

**特邀专题简介**

近年来，随着无人集群系统在实际工业系统中的广泛运用，越来越多的学者对无人集群系统协同决策、协同控制、协同感知等方面进行了深入研究，考虑到集群系统协同作业环境的复杂性，该领域的学者也逐步探索了多种约束情况下协同控制方法并得到的一些比较有代表性的成果。随着科技技术与协同控制理论的发展，对集群系统协同控制方面技术要求也逐步提高，在集群系统的控制协议的构造形式方面，从集中式控制到分布式控制再到完全分布式。集群系统在物理系统技术水平方面，也逐步从自动化到智能化再到自主化进行深层次发展。但目前关于集群系统自主化的概念定义以及能力判别边界没有统一的规范，如何实现集群系统自主化，如何体现集群系统自主化是目前集群系统协

同控制方面研究新的热点与突破点。

本特邀专题邀请以下与“集群系统自主化协同控制”主题相关的包含创新思想、概念、新发现、改进以及新应用的原创论文。

- 集群系统自主化编队控制
- 集群系统自主化博弈
- 集群系统自主化技术应用

# IEEE ICUS 2026
# Invited Session Summary

**Title of Session**

Autonomous Cooperative Control of Swarm Systems

**Organizers**

**1. Asst. Prof. Qing Wang**
Beihang University, China
**2. Prof. Yongzhao Hua**
Beihang University, China
**3. Prof. Xiwang Dong**
Beihang University, China

**Biosketches of Organizers**

**Qing Wang** received the B.E. degree from the Nanjing University of Posts and Telecommunication, Yangzhou, China, in 2017, the M.E. degree in software engineering from the School of Computer Science and Technology, Tianjin Polytechnic University, Tianjin, China, in 2020, and the Ph.D. degree in guidance, navigation, and control from the School of Automation Science and Electrical Engineering, Beihang University, Beijing, China, in 2024. He is currently an Assistant Professor with the School of Automation Science and Electrical Engineering, Beihang University. His research interests include distributed cooperative control, optimization, and multitarget tracking for multiagent system.

**Yongzhao Hua** received the B.E. and Ph.D. degrees in navigation, guidance, and control from Beihang University, Beijing, China, in 2014 and 2019, respectively. From 2019 to 2020, he was a Postdoctoral Research Associate with the Department of Aerospace Engineering, University of Bristol, Bristol, U.K. He is currently an Associate Professor with the Institute of Artificial Intelligence, Beihang University. His current research interests include distributed control, optimization, and game for multiagent systems.

**Xiwang Dong** received the B.E. degree in automation from Chongqing University, Chongqing, China, in 2009, and the Ph.D. degree in control science and engineering from Tsinghua University, Beijing, China, in 2014. From 2014 to 2015, he was a Research Fellow with the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore, and from 2014 to

2018, he was a Lecturer with the School of Automation Science and Electrical Engineering, Beihang University, Beijing, where he is currently an Associate Professor and an Assistant Dean. He is the f irst author of a monograph recently published by the Springer press and has published 60 SCI-indexed academic papers as the first author or corresponding author. He has published 18 papers in Automatica and IEEE TRANSACTIONS as the first/corresponding author, 13 of which are regular papers. His papers have been cited for more than 600 times by other researchers in Web of Science. Six papers have been selected as the top 1 to the ESI reports. His research interests include consensus control, formation control, and contain ment control of swarm systems with applications to UAV swarm systems. Dr. Dong is the recipient of the National Natural Science Fund for Excellent Young Scholars in 2019, the Wu Wenjun Artificial Intelligence Excellent Youth Award in 2018, and the Springer Outstanding Thesis Award in 2015. His four papers have received the Best Paper Awards or the Best Paper Nomination Awards in IEEE or IFAC conferences. He was selected into the Young Elite Scientists Sponsorship Program by China Association for Science and Technology in 2017. He was a Managing Guest Editor for the Special Issue on Robust Cooperative Control for Heterogeneous Nonlinear Multi-Agent Systems in IEEE TRANSACTIONS ON CYBERNETICS.

**Details of Session**

In recent years, with the widespread application of unmanned swarm systems in the actual industrial sector, an increasing number of scholars have conducted in-depth research on collaborative decision-making, collaborative control, and collaborative perception in unmanned swarm systems. Considering the complexity of the collaborative operating environment of swarm systems, scholars in this field have gradually explored collaborative control methods under various constraints and achieved some representative results. With the development of technology and collaborative control theory, the technical requirements for collaborative control of swarm systems have also gradually increased. In terms of the construction form of control protocols for swarm systems, there has been a shift from centralized control to distributed control, and further to fully distributed control. In terms of actual physical systems, swarm systems have also gradually progressed from automation to intelligence, and now towards deeper development in autonomy. However, there is currently no unified standard for the definition of swarm system autonomy and the discrimination of its capability boundaries. How to achieve swarm system autonomy and how to demonstrate swarm system autonomy are currently new hotspots and breakthrough points in research on collaborative control of swarm systems.

The invited session invites original papers of innovative ideas and concepts, new discoveries and improvements, and novel applications relevant to the following selected topics of "Autonomous cooperative control of swarm systems".

- Autonomous Formation Control of Swarm Systems
- Autonomous Game Theory in Swarm Systems
- Application of Autonomous Technologies in Swarm Systems