

Plan to Spur Safety & Emergency Equipment Industry

Policy Express

By TANG Zhexiao

Since the 14th Five-Year Plan period (2021- 2025), China's safety and emergency equipment industry has developed rapidly, with the output in key areas exceeding 1 trillion RMB in 2025. As the country enters the 15th Five-Year Plan period (2026-2030), the overlapping risks of natural disasters and various public safety challenges pose higher demands for safety and emergency equipment.

Therefore, to boost the safety and emergency equipment industry, the Ministry of Industry and Information Technology and the Ministry of Emergency Management have released a five-year plan.

The plan sets out that by 2030, the industry's scale, technological capabilities, and product quality will significantly improve, with the output in key areas reaching 1.4 trillion RMB. Ten highly competitive industrial clusters and 70 characteristic industrial parks for safety and emergency equipment



A firefighter demonstrates fire-fighting equipment to students in Jiaozuo city, Henan province. (PHOTO: XINHUA)

will be established.

The plan also sets goals for breakthroughs in a number of key core technologies, establishing a batch of priority application scenarios for safety and emergency equipment, enhancing the availability of safety and emergency prod-

ucts for households and communities.

Targeting key links in industrial development, 15 concrete tasks have been specified in four areas: boosting industrial innovation, advancing equipment promotion and application, fostering and expanding market entities, and

optimizing the industrial ecosystem.

Major measures include scaling up promotion of household emergency kits and key home safety and emergency products, encouraging leading enterprises to integrate industrial chain resources, and supporting safety emergency equipment manufacturers to pursue intelligent upgrading enabled by the "AI Plus" initiative.

Industrial innovation has been prioritized as the core task and five special columns have been outlined, covering key generic technology research and emerging technology integrated innovation. These efforts will empower safety and emergency equipment with cutting-edge technologies including AI, embodied intelligence, brain-computer interfaces and satellite remote sensing.

The safety and emergency equipment industry serves as the material foundation and technological guarantee for preventing and mitigating major risks and enhancing the ability to respond to emergencies, said Ao Li, vice president of the China Academy of Information and Communications Tech-



Physics of Fluids: Advancing Understanding of Fluid Phenomena

By Savvas G. Hatzikiriakos & Gerald G. Fuller

Physics of Fluids (PoF) was founded in 1958 on the recognition that fluid motion lies at the heart of countless natural phenomena and technological innovations and the deepest understanding of fluid motion emerges from a physics-based perspective. From the flow of blood in the human body to atmospheric and oceanic circulation, from energy production and advanced manufacturing to aerospace transportation and environmental sustainability, fluid mechanics continues to shape our understanding of the world and our ability to improve it.

Physics first

For nearly seven decades, *PoF* has remained committed to publishing research that advances the fundamental understanding of fluid phenomena. Although many engineering applications are rooted in fluid mechanics, the journal maintains its distinctive focus on the underlying physics.

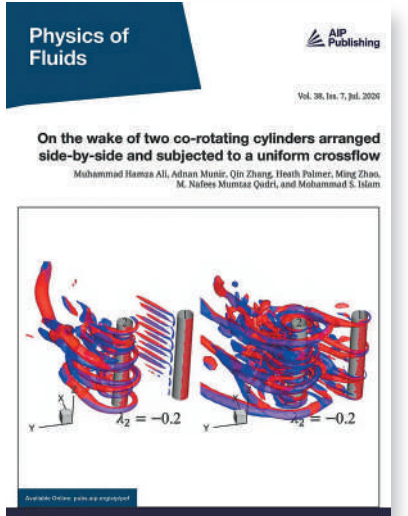
This focus is more important than ever. As fluid systems and the methods used to study them become increasingly complex, physical principles provide the foundation needed to interpret results, distinguish discoveries from purely computational or empirical observations, and transform application-specific findings into broadly applicable knowledge. We therefore seek contributions that disclose not only how fluid systems behave, but also why they behave the way they do.

Today, fluid mechanics is undergoing a remarkable revolution. Advances in high-performance computing, machine learning and AI, soft matter physics and multiphase flows are opening new avenues of discovery. *PoF* has responded by refocusing its scope and introducing special collections in emerging areas, while ensuring that new methods, simulations, and applications produce meaningful physical insight that readers can apply to new applications.

As its editors-in-chief, our vision for *PoF* is simple: physics-first, faster and fairer. We believe that scientific publishing should emphasize new physical insights and fundamental understanding, provide fair, constructive and transparent peer review based solely on scientific merit. Our objective is not only to identify and publish the highest-quality research, but also to help authors communicate the significance of their scientific contributions as clearly and effectively as possible.

Cross-community collaboration

Many significant advances now emerge from research conducted jointly across disciplines, institutions, and national borders, bringing together complementary expertise to address complex problems. *PoF* serves this global community of researchers, reviewers, and editors, united by a shared commitment to understanding



Front cover of *Physics of Fluids*, Volume 38, Issue 7. (COURTESY PHOTO)

fluid physics and its applications.

Chinese researchers have made strong contributions to fluid mechanics, providing the rigorous, innovative and physics-based studies that *PoF* aims to publish. Their work has become an important part of the journal's continued development and the broader advancement of modern fluid mechanics.

During our recent two-week visit to eight leading Chinese universities and research institutions, we saw these priorities reflected in the excellence, creativity, and engagement of researchers and students. They have contributed strongly in physics of fluid areas through papers, peer review, special collections and conference organization.

Response to emerging societal challenges

The challenges facing society, ranging from sustainable energy and climate change to advanced healthcare, transportation and manufacturing, will increasingly require breakthroughs rooted in fluid mechanics.

For example, turbulence control can improve the energy efficiency of aircraft, vehicles, pipelines, and industrial processes, while multiphase-flow research can advance carbon capture and clean-energy technologies. Progress in these areas will depend on the collective efforts of researchers working across disciplines and national borders.

Our newly formed international editorial leadership brings together expertise from leading institutions across Asia, Europe, North America and beyond, enabling the journal to identify emerging research directions and foster collaboration.

We are fortunate to live in an era of unprecedented scientific connectivity. *PoF* invites researchers worldwide to strengthen our community by contributing their finest work, serving as dedicated and fair reviewers, and helping advance fluid mechanics for the benefit of science and society.

The authors are the co-editors-in-chief of Physics of Fluids.

Journal Review

Since the 20th century, fluid mechanics has developed into one of the foundational disciplines of modern science and technology. As the field increasingly intersects with AI, data-driven modeling, soft matter, biofluids and microfluidics, it will continue to play a vital role in addressing major scientific and societal challenges.

PoF provides authoritative insight into the latest advances in fluid mechanics. Guided by its "physics-first" vision, it publishes theoretical, computational and experimental research that not only describes how fluid systems behave but also reveals the physical mechanisms governing

that behavior.

Looking ahead, *PoF* is expected to continue its tradition of excellence as a premier journal for research on fluid phenomena. By embracing emerging tools such as AI while addressing critical challenges in energy, sustainability and healthcare, *PoF* will help lead fluid physics into a new era of discovery and innovation.

— Dimitris Vlassopoulos, professor at the University of Crete, and affiliated faculty at the Institute of Electronic Structure and Laser of the Foundation for Research and Technology-Hellas, Greece

1st Mandatory Standard for L3, L4 Autonomous Driving Unveiled

Edited by TANG Zhexiao

China has released its first mandatory national standard for autonomous driving systems.

According to the Ministry of Industry and Information Technology (MIIT), the standard Intelligent and Connected Vehicle — Safety Requirements of Combined Driver Assistance System (GB 44721-2026) will come into force on July 1, 2027.

The standard applies to Class M and Class N vehicles equipped with level

3 or level 4 autonomous driving systems, excluding autonomous parking systems.

It requires potential safety hazards of autonomous driving systems to be reduced at the source. Vehicle manufacturers are specified to set up and enforce safety safeguards covering four dimensions: safety policy, risk management, safety assurance and safety improvement. These measures include relevant simulation, closed-site and road tests throughout the research and validation phase of autonomous

driving systems.

The standard also mandates improved performance when the system carries out dynamic driving tasks to guarantee operational safety. It lays down specifications for human-machine interaction and user notifications to prevent misuse or abusive use.

The activation and deactivation of the autonomous driving system must be carried out safely, with clear guidelines for indicators and alerts for system states including standby, active and deactivated modes.

Shandong: Building World-class Innovation Ecosystem

Case Study

By TANG Zhexiao & WANG Yanbin

China has made a significant breakthrough in deep-sea engineering equipment, with its domestically developed chain trenching robot completing sea trials in the Yellow Sea and setting a new record for the deepest trenching operation in Asia.

The 30-tonne deep-sea operating robot manufactured by Shandong Future Robot, capable of working at a depth of 3,500 meters, has filled a domestic gap, while a 20-plus-ton cable-laying robot for 1,500-meter depths has achieved full, independent control over the entire industry chain.

Jiang Libin, director of the Project Department of Shandong Future Robot, said government support during critical phases of the startup and technical R&D has been the cornerstone of its success

in mastering core deep-sea equipment technologies.

The rapid growth of the company is a vivid microcosm of Shandong's efforts to build a world-class sci-tech innovation ecosystem.

In recent years, Shandong has optimized its innovation environment across eight dimensions, including government administration, talent, industry, and enterprise development, enhancing the overall innovation atmosphere.

The focus of Shandong's strategy is strengthening the central role of enterprises in sci-tech innovation. In the advanced steel industry chain, Tianrun Industry Technology Co., Ltd. targeted foreign technological monopolies.

In the third-generation semiconductor sector, Shandong Crystal GaN Semiconductor Co., Ltd. partnered with Shandong University to overcome the challenge of developing gallium nitride (GaN) single crystals.

To support enterprise innovation, Shandong has rolled out a tiered, post-

investment policy for corporate R&D. Companies with R&D expenses accounting for over five percent of their revenue will receive priority support in land allocation and energy consumption.

Additionally, Shandong is creating 30 distinctive demonstration scenarios in fields like autonomous driving and the low-altitude economy, and promoting first trial and application of 200 new technologies and products.

To address the persistent disconnect between scientific research and industrial application, Shandong has put in place a system where "industry poses the questions, science provides the answers, and the market evaluates the results," to bridge the last mile from the laboratory to the production line.

For instance, the deep-sea aquaculture technology breakthroughs of the Marine Instrumentation Institute of Shandong Academy of Sciences were shared with Qingdao enterprises through the online marine technology

Robotics Marches Toward Real Business World

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In addition, the newly added high-intensity competitive events — such as long jump, weightlifting, tug-of-war, and table tennis — are all ultimate tests of the robots' "brain," "cerebellum," physical structure, and core components.

"Every extra centimeter in a robot's long jump and every extra kilogram it lifts on the competition field are the re-

sults of engineers' continuous optimization of joint motors and reducers, precision machining, and rigorous testing and verification," said Jiang Guangzhi, executive deputy director of the Organizing Committee of the World Humanoid Robot Games.

At the 2026 WRC, exhibitors demonstrated robots capable of autonomous navigation, dynamic task scheduling, and

real-time error correction in unpredictable environments. No longer restricted to pre-programmed dances or static laboratory demonstrations, the latest generation of robots is proving that they can think, adapt, and work alongside humans.

This pragmatic shift is underpinned by a maturing industrial ecosystem and a double-digit industrial growth rate. Latest data reflects this mo-

mentum: The operating revenue of industrial enterprises above designated size in China's robotics sector exceeded 300 billion RMB in 2025, with an average annual growth rate of more than 20 percent over the past five years.

As the curtain fell on the WRC 2026 and the second World Humanoid Robot Games, the goal for robots is not only to "win medals," but also to "secure orders."