

Editorial

Fans: Noise, Aerodynamics, Applications and Systems—The Best of the International Conference FAN2025

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Industrial fans are indispensable components in modern engineering systems. They play a critical role in ventilation, cooling, and gas handling across a wide range of industries. At the same time, together with their associated drive systems, fans account for a significant share of global electricity consumption. Beyond energy use, their broader environmental impact—including noise emissions, recyclability, and repairability—is relevant in the context of sustainable engineering.

This Special Issue of the International Journal of Turbomachinery, Propulsion and Power (IJTPP) presents selected contributions from the FAN2025 conference, held in Antibes, France, in April 2025. Organized by CETIAT and CETIM in collaboration with several international universities and industry partners, the conference provided a global platform for discussing the latest scientific and technological developments in fan technology. This Special Issue aims to highlight papers of outstanding academic quality, as well as those addressing current and emerging challenges in the field.

A recurring theme among the contributions is the aerodynamic design of fans. While analytical models—validated through numerical flow simulations and experiments—continue to form a solid foundation, simulation techniques now enable efficient evaluation of several design variants and support automated optimization workflows. Increasingly, novel approaches based on Artificial Intelligence (AI) and machine learning are being explored. These techniques promise new capabilities, although their full potential in fan design has yet to be fully realized.

Another area of ongoing relevance is the prediction and mitigation of flow-induced noise, which is now becoming a standard task in fan development. Sophisticated computational aeroacoustic (CAA) methods—though computationally demanding—are being applied to ever more detailed aspects of fan systems, including secondary components such as blade tip geometries and protective grills.

It has also become clear that even the most efficient and quiet fans can only reach their full potential when integrated into well-optimized systems. Methods such as discrete optimization allow for the simultaneous consideration of multiple objectives—minimizing not only energy consumption but also investment cost, noise, and other key performance indicators. In this context, the ongoing development of standardized metrics to evaluate the overall energy efficiency and environmental impact of fan systems remains a critical area of discussion—especially in the light of ongoing dialog with regulatory institutions.

This Special Issue reflects the dynamic and multidisciplinary nature of current research and development in the field of industrial fans. It is marked by close collaboration between academia, public research bodies, and industry. The continued engagement of



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manufacturers and end users alike highlights the practical relevance and broad support for this work.

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