Special Issue

Flow Control and Aerodynamic Performance of Axial Flow Turbine

Message from the Guest Editors

Axial flow turbines are critical components in gas and steam turbine engines, where efficiency, reliability, and performance are paramount. This Special Issue focuses on recent advances in controlling flow phenomena within axial turbines, aiming to enhance their aerodynamic performance under varying operational conditions. Key challenges include managing secondary flows, boundary layer separation, tip leakage and wake mixing—factors that significantly contribute to aerodynamic losses. Emerging flow control techniques, both passive (e.g., end wall contouring, fillets, and vortex generators) and active (e.g., synthetic jets and pulsed blowing), offer promising solutions to mitigate these losses and improve turbine stage efficiency. The integration of accurate low-, mid-, and high-fidelity computational studies, experimental studies, and machine learning approaches enables deeper insight into flow behavior and control strategies. Contributions are invited that explore novel methodologies, validate control techniques, or present design optimizations that lead to improved flow uniformity, reduced losses, and enhanced overall turbine performance.

Guest Editors

Dr. Dhuree Seth

Department of Aerospace Engineering and Engineering Mechanics, University of Cincinnati, Cincinnati, OH 45221-0070, USA

Dr. Sam Salehian

Department of Aerospace Science and Engineering, Tuskegee University, Tuskegee, AL 36088, USA

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Machines
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
machines@mdpi.com

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Machines is an international, peer reviewed journal on machinery and engineering. It publishes research articles, reviews and communications.
Our aim is to encourage scientists to publish their experimental and theoretical results in as much detail as possible. There is no restriction on the length of the papers. Full experimental and/or methodical details must be provided.
There are, in addition, unique features of this journal: Manuscripts regarding research proposals and research ideas will be particularly welcomed; Electronic files or software regarding the full details of the calculation and experimental procedure - if unable to be published in a normal way can be deposited as supplementary material.

Editor-in-Chief

Prof. Dr. Antonio J. Marques Cardoso
CISE - Electromechatronic Systems Research Centre, University of Beira Interior, Calçada Fonte do Lameiro, P-6201-001 Covilhã, Portugal

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