



Data-Driven Aerodynamic Modeling

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Message from the Guest Editors

Dear Colleagues,

Data-driven modeling in general and machine learning techniques in particular have transformed our everyday life over the past few years. In areas for which vast amounts of data are available, the aforementioned techniques have achieved remarkable success, especially when mathematical models are lacking. Instead, aerodynamic tools such as computational fluid dynamics solvers rely on first principles that directly enable us to describe and investigate system behavior. Numerical simulation tools derived from these principles have become invaluable in aircraft design and are about to significantly contribute to the green transformation of the aviation sector. However, such tools are far from perfect and suffer from several shortcomings, e.g., computational cost may become prohibitive once a large number of simulations are required, or there is the problem of deriving accurate and reliable turbulence models to describe small-scale turbulent flow behavior. Data-driven modeling is generally regarded as a promising approach to enhance and complement existing aerodynamic methods and tools to circumvent some of these shortcomings and to improve physical modeling.





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