STS05

Shock Wave Boundary Layer Interaction in Aeronautical Applications

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Knowledge of the shock wave boundary layer interaction (SBLI) is essential for the development of more efficient aircraft and propulsion. This session aims at presenting selected results from the H2020-MSCA-ITN TEAMAero (Towards Effective Flow Control and Mitigation of Shock Effects in Aeronautical Applications) project [1].

The main objective of TEAMAero is: (1) to improve fundamental understanding of the physics of SBLI, including three-dimensionality and unsteadiness (2) to develop flow control for mitigation of SBLIs effects, and (3) to develop numerical methods for improvement of SBLIs effects prediction. This session brings together researchers focused on developing algorithms for high-speed flows and application of numerical methods in solving fundamental and industrial problems. Contributing presentation will focus on algorithms development for techniques in Direct Numerical Simulations (DNS) of turbulent high-speed boundary layers, RANS and LES for transitional SBLIs in basic flow configuration (flat plate) and application cases. Results from numerical simulations for supercritical wing and highly loaded transonic compressor cascade will be presented. The session will include papers in the following topics:

Three Decades of SBLI in European Research
Piotr Doerffer, Pawel Flaszynski, IMP PAN, Gdansk, Poland

Numerical Tripping of Supersonic/Hypersonic Boundary Layers
Alessandro Ceci, Andrea Palumbo, Sapienza University of Rome, Italy, Johan Larsson, Univ. of Maryland, USA and Sergio Pirozzoli, Sapienza University of Rome, Italy

Length and Time Scale Comparison in Different Transitional SBLIs
Mariadebora Mauriello, Lionel Larcheveque, Aix-Marseille Univ., CNRS, IUSTI, France

Numerical Simulation and Turbulence Modelling of a 3D Transonic Regime around a Supercritical Wing Involving Strong Separation
César Jimenez-Navarro, Aberdahmane Marouf, Clément Rouaix, Institut de Mécanique des Fluides de Toulouse, France, Nikolaos Simiriotis Imperial College of Science and Technology, London, UK, Yannick Hoarau, Universite de Strasbourg, France, Marianna Braza, Institut de Mécanique des Fluides de Toulouse, France

Transonic Buffet Simulation using a Partially-Averaged Navier-Stokes Approach
Andrea Petrocchi, Rene Steijl and George N. Barakos, Univ. of Glasgow, UK

Numerical Investigations of Transitional SBLI on a Highly Loaded Transonic Compressor Passage in Industrial Applications
Selin Kahraman, Paolo Adami, Marius Swoboda, Rolls-Royce Deutschland, Germany

Test Section Design for Investigations of SBLIs in Highly Loaded Compressor Stator
Arun Joseph, Pawel Flaszynski, Michal Piotrowicz, Piotr Doerffer, IMP PAN, Gdansk, Poland

LES of Compressor Cascade Shock-Boundary Layer Interaction at Engine-Representative Conditions
Philipp Nel, Paolo Adami, Rolls-Royce Deutschland, Germany