On high-order simulations of high-speed flows and acoustics

Dimitris Drikakis

University of Nicosia, Cyprus

Abstract:

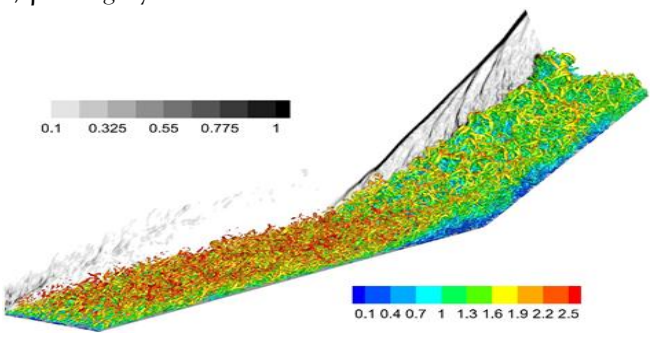
The presentation concerns the use of high-order and high-resolution methods as a tool for modelling high-speed flows and acoustics. In particular, we present implementation of the above techniques in conjunction with implicit Large Eddy Simulations (iLES) and Direct Direct Numerical Simulations (DNS). We show that increased accuracy achieved by these methods in transition, fully turbulent flow, shock boundary layer interaction and near-wall acoustic effects.

Keywords:

High-Speed Flows Turbulence, Acoustics, Direct Numerical Simulation, implicit Large Eddy Simulation

Relevant Image:

Direct numerical simulation of shock-turbulent boundary layer interaction at Mach 2.9 and Reδ=38737, based on the boundary layer thickness, using 9th order accurate methods. Isosurfaces of the QM-criterion ($2U2\infty/\delta 2$) coloured by the Mach number and 2D ($x-z$) contour plane of the density gradient magnitude $|\nabla\rho|\delta/\rho\infty$ in grayscale.



Biography:

Dimitris Drikakis is the Vice President for Global Partnerships and Executive Director, Research and Innovation at the University of Nicosia, Cyprus. He has a joint professor's appointment in the School of Sciences and Engineering, and Medical School. Prior to that, he held academic and executive posts as Professor, Executive Dean (Strathclyde Univ), and Head of Aerospace (Cranfield University) over a period of 24 years; he has also held senior academic/research posts in Germany and France. His research is multidisciplinary and covers topics of engineering science and emerging technologies, including fluid mechanics, acoustics, materials, computational science with applications to aerospace, biomedicine, defence, and energy sectors. He has received the William Penney Fellowship Award by the UK's AWE Plc in recognition of his contributions to multicomponent flows; and the Innovator of the Year Award (2014) by the UK's Innovation Institute for a new generation carbon capture nanotechnology device. He has co-authored two books and has published 430 papers in journals and conference proceedings. He has graduated 45 PhD students who now hold positions in academia and industries around the world. He has also been an Assoc. Editor of Computers and Fluids; Journal of Fluids Engineering; The Aeronautical Journal of the Royal Aeronautical Society; Journal of Computational and Theoretical Nanoscience; (advisory board) Physics of Fluids; as well as serves on editorial boards in several journals in the fields of Engineering (Aerospace, Biomedical, Energy, Defence), Computational Science, Applied Physics, and Nanotechnology. He has also served on the Fluid Dynamics Technical Committee of the American Institute of Aeronautics and Astronautics; Board of Directors of the European Aeronautics Science Network; European Research Council (Engineering – Deputy Chair); European Commission (evaluator); UK's Oil and Gas Technology Centre (OGTC), as a Chair of the academic panel.