OpenFOAM & Combustion Simulation

Adaptive high-resolution simulation of reactive high-speed flows with the AMROC framework

Prof. Ralf Deiterding

Department Aeronautics and Astronautics, University of Southampton

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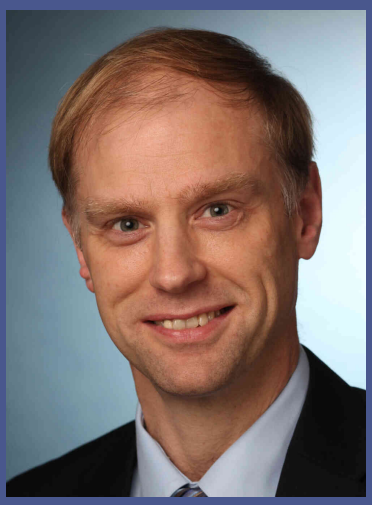
Host: Prof. Huangwei Zhang (National University of Singapore)

Register: https://nus-sg.zoom.us/webinar/register/WN_Gz7TdvqCQDCsJP7Y65RQcg

Abstract

A trend in modern computational fluid dynamics (CFD) is the use of Cartesian methods. Combining solution-adaptive Cartesian grids with boundary layer meshes, grown from a surface triangulation, leads to a particularly efficient hybrid approach, called strand meshing. Our generic parallel finite volume framework AMROC supports dynamically adaptive structured schemes in general and Cartesian coordinates as well as level-set-based embedded and strand-mesh boundary treatment techniques. After outlining AMROC's generic hierarchical mesh adapation approach, the presentation will discuss some high-resolution shock-capturing methods for chemically reactive flows in the high-speed regime. Applications examples will include shock-induced combustion, detonation structures, deflagration-to-detonation transition and combustion waves in rotating detonation engines as well as hypersonic shock-boundary layer flows in dissociating air. An outlook on lattice Boltzmann methods will additionally illustrate the suitability of AMROC for high-resolution subsonic aerodynamic simulation.

About the Speaker



Ralf Deiterding is Professor of Numerical Methods in Fluid Dynamics at the University of Southampton (UoS). He joined UoS in 2015 after appointments at the California Institute of Technology, Oak Ridge National Laboratory and the German Aerospace Centre (DLR). After stuyding Technomathematics at the Technical University of Clausthal, he obtained a Ph.D. in Applied Mathematics and Computational Fluid Dynamics (CFD) from the Brandenburg Technical University Cottbus in 2003. His research focuses on the development and application of innovative high-resolution and multiscale simulation methods for CFD. He is the main author of the simulation frameworks AMROC and Virtual Test Facility, which are available at http://www.vtf.website.