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UNSTRUCTURED HIGH-ORDER METHODS FOR SCALE-RESOLVING SIMULATIONS

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ABSTRACT

Scale-resolving simulations are becoming ever more tractable. Currently an important research effort is dedicated to making this type of simulation available for aerodynamic and acoustic design, involving both complex geometry and delicate physical phenomena. Unstructured high-order methods are seen as a major enabling technology, since they combine "academic" accuracy, arguably indispensable for scale-resolving simulations, to "industrial" geometric flexibility. Due to data locality and algorithmic intensity, they are well adapted to modern HPC architectures, allowing for a drastic reduction in computation lead time. Currently a large effort is dedicated to implementation and validation of scale-resolving approaches, often in combination with hp-adaptation. Another important challenge concerns the automated generation and adaptation of unstructured curved meshes. Also in-situ analysis and visualisation tools for high order solutions, indispensable for large scale computations, are currently at best available in academic prototypes. This minisymposium presents the latest research in on unstructured high-order methods for scale-resolving simulations, focussing on both challenges. The MS also welcomes talks on practical applications and HPC aspects.

Dr. Hillewaert leads the development of a high-order DGM solver for turbomachinery LES [1]. His group is part of the European project Tilda on high-order methods for industrial LES. Dr. Murman and Dr. Carton de Wiart are part of a group working on a high-order space-time entropy stable DGSEM code, designed to face NASA's major computational challenges [2].

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