Recent advances in high-order mesh generation

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Rationale for minisymposium

The use of high-order methods within the scientific community continues to expand, owing to their attractive numerical properties and potential to efficiently utilise modern hardware when compared against lower-order methods. However, the starting point for any high-order solver is a valid, high-quality mesh of the desired geometry, in order to provide good quality solutions to the problem at hand. At present, the generation of such meshes for complex configuations poses a significant challenge, imposing a barrier on the more widespread uptake of these methods.

To provide a forum for discussion on this topic, we propose a two-session minisymposium of 8 speakers, in which we will bring together experts from academia and industry to discuss progress on the latest techniques in high-order mesh generation. The proposed talks include topics of significant interest in challenging problem areas, including boundary layer mesh generation, parallel distributed mesh curving and techniques that can be used to enable adaptive simulations in terms of mesh size (h-adaptation), element location (r-adaptation) and polynomial order (p-adaptation).

Organization

For this minisymposium, we have selected eight talks populating two sessions. We note that there is intentionally no single application area, with talks from a range of speakers designed to encourage a broad discussion of the most recent research in the mesh generation community.

Potential talk titles and author information

- *Solution-based H-P Adaptation for Curved Geometries*
  Steve Karman* and Nick Wyman (Pointwise Inc.)

- *Title TBC*
  Ruili Zhang*, Amaury Johnen, Jonathan Lambrechts and Jean-Francois Remacle (Universite Catholique de Louvain)

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- *Advances in r-adaptation for compressible flow simulations*
  Joaquim Peiró* (Imperial College London) and David Moxey (University of Exeter)

- *Target-matrix optimization paradigm for r-adaptivity with high-order meshes*
  V. Dobrev *, Tz. Kolev, K. Mittal, V. Tomov (Lawrence Livermore National Laboratory)

- *Anisotropic optimization of curved meshes: specific-purpose line-search and trust-region globalizatinos for Newton's method*
  Guillermo Aparicio-Estrems, Abel Gargallo-Peiro, Xevi Roca (Barcelona Supercomputing Center)

- *Pre-conditioning and continuation for parallel distributed mesh curving*
  Eloi Ruiz-Gironés, Xevi Roca (Barcelona Supercomputing Center)

- *Title TBC*
  Per-Olof Persson*, University of Berkeley

Remark: * denotes the author that will present the paper.