Minisymposium Title: Advanced methods and applications in mesh adaptation

Abstract: Recently, there has been a significant amount of attention given to mesh adaptation methods. Such methods alter the mesh in response to the numerical solution of the associated partial differential equation (PDE). In particular, the mesh may be adaptively refined in order to efficiently capture the PDE features which occur at various scales. Despite this strong tradition in mesh adaptation, several trends in the computational physics community represent important challenges for current adaptation methods. Firstly, the growing interest in unsteady, multiphysics problems implies a need for sophisticated mesh adaptation procedures. For instance, cardiac simulations involving arrhythmias also require advanced mesh adaptation methodology due to the irregularity in the heart's activity. Another example is the use of local dynamic mesh refinement to capture and track moving interfaces in multi-phase flows that take place in material forming processes. Secondly, the evolution of PDE discretization methods and algorithms requires specific mesh adaptation techniques. This is particularly true for mesh adaptation algorithms designed for massively parallel solvers, and high-order mesh adaptation methods that help exploiting the full potential of recent high-order spatial discretization schemes. Finally, there is an increasing demand in the industry for simulation technologies that can be used by application engineers who possess limited numerical knowledge. In this framework, automatic mesh adaptation procedures aiming at replacing the expertise of mesh generation specialists, rather than just maximizing the efficiency of the computations, are seen as valuable tools.

The goal of the minisymposium is to bring together researchers whose focus is on the development of advanced methods in mesh adaptation with those who apply adaptive mesh techniques to advanced applications in science and engineering. The minisymposium will feature talks by mathematicians, computer scientists, engineers, and scientists who work in the field of mesh adaptation.

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