SAN DIEGO STATE UNIVERSITY

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Department of Mathematics & Statistics

MATHEMATICS COLLOQUIUM

Presents

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Institute for Numerical Mathematics

Tuesday, September 10 2019

4:30pm GMCS 405

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Adaptive Mesh Refinement and Coarsening

Abstract:

In this talk, we present a MATLAB -Toolbox named ameshref that provides an efficient implementation of various adaptive mesh refinement strategies allowing triangular and quadrilateral grids with and without hanging nodes. For selected methods, we give an insight into the strategy itself and the core ideas for an efficient realization. This is achieved by utilization of reasonable data structure, use of MATLAB built-in functions and vectorization. To serve educational purposes on how to implement a method efficiently, the code is kept accessible but short. Numerical experiments underline the efficiency of the code and show the flexible deployment in different contexts where adaptive mesh refinement is in use. Our implementation is accessible and easy-to-understand and thus considered to be a valuable tool in research and education. As coarsening is also an important part for mesh adaption, we present approaches on how to coarsen a mesh generated with the ameshref-package. We cover difficulties that arise from this non-recursive implementation and how to overcome this by exploiting information that is implicitly given within the data structure.

ameshref-package: https://github.com/aschmidtuulm/ameshref

The talk aims to reach a wide audience (students are welcome!).