

An Overview of the Overture Framework for Solving PDEs on Overlapping Grids.

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An overview will be given of the Overture framework and the CG (Composite Grid) suite of PDE solvers. Overture is a toolkit for solving PDEs in complex geometry using composite overlapping grids (also known as Chimera or overset grids). Overture has extensive grid generation capabilities, high-order accurate finite-difference and finite-volume approximations to differential operators and boundary conditions, support for the solution of implicit systems, a multigrid solver for overlapping grids and interactive graphics. The CG suite of PDE solvers includes physics solvers for the incompressible Navier-Stokes equations (cgins), the compressible Navier-Stokes, and reactive Euler equations (cgens), heat transfer and advection diffusion (cgad), solid-mechanics (cgsm), and Maxwell's equations (cgmx). The incompressible and compressible flow solvers support moving grids for problems with rigid or deforming bodies. There is also a multi-physics solver (cgmp) under development that can be used to solve multi-domain fluid-solid problems where a given sub-domain can be treated using one of CG solvers.

This talk will give an overview of the capabilities in Overture and also discuss recent work including the development of algorithms and interface approximations for solving conjugate heat transfer problems that couple incompressible fluid flow to heat conduction in solids. Work is also progressing on solving fluid-structure interaction problems and some preliminary results will be given.