

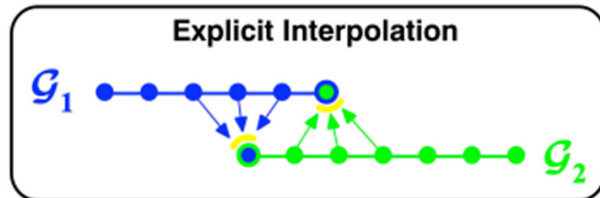
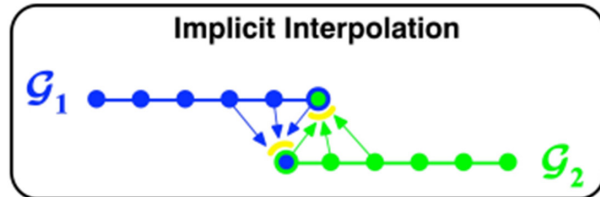
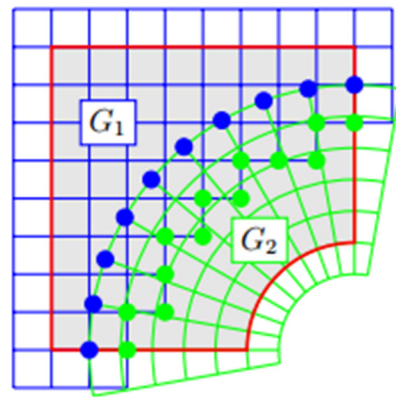
Mimetic Discretization Methods on Overlapping Grids



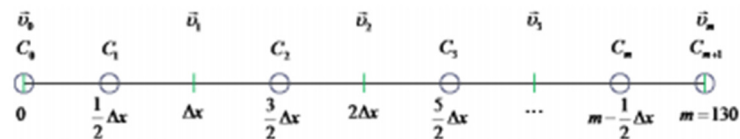
Overture is a portable and flexible object-oriented framework for solving partial differential equations (PDEs). One of its features is the composite overlapping grid generation for solving problems that involve the simulation of complex moving geometry. Overlapping grids are a type of block structured body-fitted conforming grids that are used to resolve fine-scale features in a particular domain. One of the most prominent advantages of using these grids is the high efficiency for high-order methods. We examine the viability of mimetic operators on overlapping grids by solving representative PDEs on grids generated by Overture, while exploring different interpolation techniques on these grids (both implicitly and explicitly).

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This research is supported by the Computational Science Research Center (CSRC) at San Diego State University



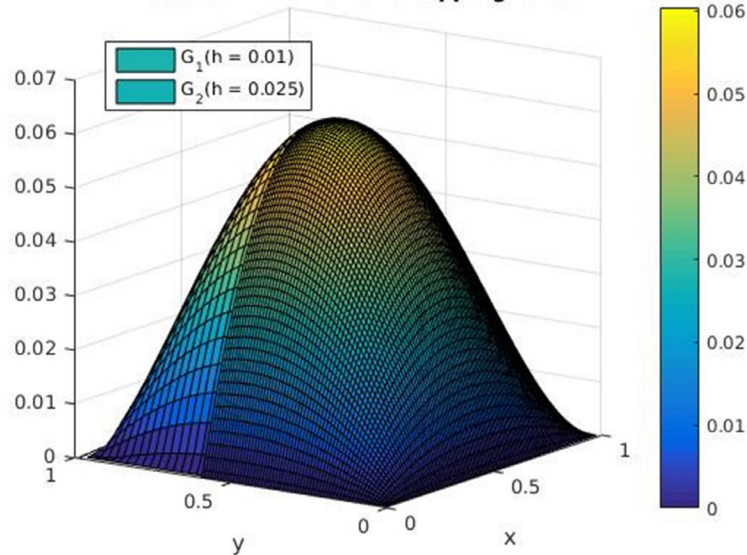
● Interpolation points ▲ Interpolee points
● Discretization points ▲



$$(\Delta x)D = \begin{bmatrix} -1 & 1 & & \\ & & \ddots & \ddots \\ & & & -1 & 1 \end{bmatrix}_{(m+2) \times (m+1)}$$

$$(\Delta x)G = \begin{bmatrix} \frac{-8}{3} & 3 & \frac{-1}{3} & & \\ & -1 & 1 & & \\ & & \ddots & \ddots & \\ & & & -1 & 1 \\ & & & \frac{1}{3} & -3 \end{bmatrix}_{(m+1) \times (m+2)}$$

2D Poisson: MFD on Overlapping Grids



Richards Equation: MFD on Overlapping Grids

