



Universidad
Carlos III de Madrid

Seminario

Meshfree finite difference methods with minimal positive stencils

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Abstract

The finite difference method is one approach to approximate a partial differential equation by a finite dimension problem. An important example is the approximation of the Poisson equation by a large, sparse linear system. While finite differences are well established for friendly geometries with regular grids, the approach can also be generalized to fully unstructured geometries, and even to disconnected “clouds” of points, which frequently arise in particle methods. Two new aspects come into the game here: first, there are many possible consistent finite difference approximations, and there is no simple principle that defines a “best” one; second, with many classical meshfree approaches, the arising linear systems are in general non-symmetric, do not have an M-matrix structure, and are significantly less sparse than finite difference matrices on regular geometries. All of the latter aspects are detrimental for the performance of linear solvers. I will present an approach, based on ℓ^1 optimization, that selects minimal positive stencils, and thus generates optimally sparse M-matrices.

- **DÍA Y HORA: jueves 19 de mayo de 2011 a las 12:30**
- **LUGAR: Edificio Sabatini. Aula 2.3 A04**