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Departamento de Matemática, UBB

Centro de Investigación en Ingeniería Matemática (CI^{2}MA), UDEC

Expositor:

Leonardo Figueroa

Centro de Investigación en Ingeniería Matemática (CI^{2}MA), Universidad de Concepción.

Título de la Charla:

Greedy approximation of a singular and high-dimensional elliptic PDE using spectral bases

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Resumen

We study the approximation of an elliptic Fokker–Planck equation arising in kinetic models of dilute polymers posed on a high-dimensional domain $\mathbf{D} = D_1 \times \cdots \times D_N$ contained in $\mathbb{R}^{Nd}$, where each set D_i, $i \in \{1, \ldots, N\}$, is a bounded open ball in $\mathbb{R}^d$, $d \in \{1, 2, 3\}$, and whose principal symbol vanishes at $\partial\mathbf{D}$. The approximation method under consideration was introduced in the engineering literature under the names *Separated Representation* and *Proper Generalized Decomposition*. As recognized by Le Bris, Lelièvre and Maday in the non-singular case, this method is an instance of a *Greedy Algorithm* of the theory of nonlinear approximation whose core consists of the minimization of a sequence of Dirichlet energies on a nonlinear submanifold of the full space of admissible functions—that is, the variational search space is replaced by a search manifold. In this talk, I will expound on a discretized variant of the method for the singular case in which the search submanifold is defined as the set of functions of the form

$$r^{(1)} \otimes \cdots \otimes r^{(N)}$$

with each $r^{(i)}$ being a member of a finite-dimensional spectral subspace of the corresponding analogue of what in the non-singular case would be the $\mathrm{H}^1_0(D_i)$ space.