Seminario de Estudiantes de Postgrado en Ingeniería Matemática

Sesión 7 - 2026

Martes 24 de noviembre, 12:30 horas, auditorio Hermann Alder Weller, CI²MA



A posteriori error analysis for an HDG scheme applied to an advection-diffusion equation

We present a residual-based a posteriori error analysis of a primal hybrid discontinuous Galerkin method for the advection–diffusion equation, motivated by the transport of salt in reverse osmosis desalination. The concentration is advected by a given velocity field along a rectangular channel whose horizontal boundaries are formed by a semipermeable membrane, modeled by a Robin-type condition. A Dirichlet condition is prescribed at the inlet, and an outflow condition is imposed at the outlet. We derive an a posteriori error estimator for the error in a DG-type energy norm. It consists of element residuals, jumps of the normal flux, residuals on the membrane and outflow boundaries, a term that measures the discrepancy between the approximation and the hybrid unknown, and a term that measures the approximation of the inlet datum. The analysis follows the standard approach for conforming methods, combined with the Oswald interpolant, which provides a conforming approximation of a piecewise polynomial function. Under an assumption relating the membrane coefficient to the normal component of the velocity at the membrane, we prove that the estimator is reliable and locally efficient. We provide numerical experiments that validate the performance of the proposed estimator.

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