

ROBUSTNESS IN A PRIORI AND A POSTERIORI ESTIMATES AND SOLVERS

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ABSTRACT

In numerical approximation of PDEs, the design of a numerical method is justified by a priori error estimates, while its actual behavior is controlled by (and possibly steered by) a posteriori error estimates. Besides, to practically obtain the numerical approximation, a suitable solver for the associated system of nonlinear or linear algebraic equations is needed.

Numerical parameters (such as mesh size and regularity, polynomial degree, or amount of stabilization) and PDE parameters (such as mutual ratios of advective, reactive, and diffusive effects, wavenumber, strength of the nonlinearity, or final time size for evolution problems) enter the numerical analysis and can affect the actual performance of such methods. When the analysis and/or the practical performance of these methods is insensitive to these parameters, we speak of robustness. The subject of this minisymposium is robustness in a priori and a posteriori error estimates and in (iterative) algebraic solvers.

SPEAKERS

1. Alexandre Ern (Ecole nationale des ponts et chaussées, Paris): Robustness for time schemes for convection-diffusion problems in a priori analysis.
2. Michael Feischl (TU Vienna): Optimal adaptive timestepping for nonlinear problems.
3. Johnny Guzmán (Brown University): Bounded commuting projections preserving discrete boundary data.

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4. Martin Halla (Karlsruhe Institute of Technology): Length-explicit stability analysis of optical fibers.
 5. Kaibo Hu (University of Oxford): Robustness in structure-preservation: topology-preserving methods for magnetohydrodynamics.
 6. Pierre Jolivet (CNRS/Sorbonne University): Adaptive spectral domain decomposition preconditioners for sparse linear systems.
 7. Yuwen Li (Zhejiang University): Polynomial-degree-robust a posteriori error estimates based on iterative solvers.
 8. Lorenzo Mascotto (Università degli Studi di Milano-Bicocca): Locking-free and gradient-robust a posteriori error estimates for the linear elasticity problem.
 9. Markus Melenk (TU Vienna): Wavenumber-explicit FEM-BEM coupling for the Helmholtz equation.
 10. Ani Miraçi (Sorbonne University): Adaptive finite element methods with optimally preconditioned GMRES guarantee optimal complexity.
 11. Michael Neilan (University of Pittsburgh): Structure preserving discretizations for the surface Stokes problem.
 12. Charles Parker (U.S. Naval Research Laboratory): Co-designing finite elements and augmented Lagrangian preconditioners for incompressible flow.
 13. Emile Parolin (Inria Paris): Robust iterative solvers for wave propagation problems based on domain decomposition methods.
 14. Rob Stevenson (University of Amsterdam): Robust solvers of time-space discretizations of parabolic PDEs with strongly monotone spatial operators.
 15. Hendrik Speleers (University of Rome Tor Vergata): Optimal spline spaces for outlier-free isogeometric analysis.
 16. Andreas Veiser (Università degli Studi di Milano): On robust quasi-optimality of Petrov-Galerkin methods.
 17. Ludmil Zikatanov (Pennsylvania State University): A posteriori error estimates by preconditioning.