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INTERPLAY BETWEEN DISCRETIZATION, ALGEBRAIC, AND LINEARIZATION ERRORS
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ABSTRACT

In the past few decades, simulation of physical phenomena has become an essential procedure for many applications in engineering and beyond. The scientific community now contemplates problems with ever-increasing complexity and has to rely on discretization methods combined with linear and nonlinear iterative algebraic solvers in order to obtain numerical solutions at an acceptable cost. In turn, this requires users to handle algebraic and linearization errors in addition to the standard discretization errors. The control of all error components is paramount to the topic of simulation because: (i) such errors could invalidate numerical predictions; (ii) their interplay opens a vast territory for adaptivity, way beyond the traditional adaptive mesh or polynomial degree refinement.

Algebraic and linearization solvers, and the associated algebraic and linearization errors they inevitably generate, are most commonly treated separately from the discretization of the system by considering linear and nonlinear algebra arguments. However, there has recently been a rise in the development of integrated strategies where all error components are treated simultaneously rather than in a sequential manner. As a result new questions and challenges arise such as convergence analysis, cost optimality, and robustness.

The purpose of the minisymposium will be to expose recent advances on the challenges brought about by the interplay between discretization, algebraic, and linearization errors. We expect contributions on the following topics:

- Norm and/or goal-oriented *a posteriori* error estimation and adaptivity;
- Stopping criteria for linear and nonlinear solvers;
- Dedicated procedures under inexact solvers;
- Design of algebraic solvers on *hp* grids;
- Robustness with respect to *h*, *p*, and material properties;
- Convergence and optimality of integrated strategies.