SIGEST

The SIGEST article in this issue, "Asymptotically Compatible Schemes for Robust Discretization of Parametrized Problems with Applications to Nonlocal Models," by Xiaochuan Tian and Qiang Du, concerns differential equation models that (a) involve a physical parameter, and (b) change their nature when this parameter reaches an asymptotic limit. The work is motivated by nonlocal peridynamic models in continuum mechanics, which reduce to classical differential equation models as the horizon parameter tends to zero. In this setting, a numerical method is said to be *asymptotically compatible* if it produces approximations that are robust in such a limit. This is an important property which allows us to avoid inaccurate or unphysical numerical solutions from inappropriate choices of model and discretization parameters.

The authors develop a general framework that relies on minimal assumptions. Their high-level results, provided in Theorems 2.6 to 2.8, are neatly summarized in Figure 2.1. The results are then applied to finite element discretizations of nonlocal diffusion and peridynamic models. Numerical experiments are also provided to validate the results.

The original article appeared in the *SIAM Journal on Numerical Analysis* (SINUM) in 2014. As indicated by its high citation count, this work is relevant to many circumstances where multiscale or nonlocal effects are present; examples include viscosity limits in nonlinear conservation laws, phase field models with sharp interfaces, and smoothed particle hydrodynamics.

The original SINUM article presented an asymptotically compatible framework for self-adjoint problems. In converting their article into SIGEST form, the authors have extended the results to cover both self-adjoint and non-self-adjoint problems with parameter-dependent data. Here, some modifications, and new notation, were required to distinguish between operators and their adjoints, between test and trial functions, and between the associated function spaces. The authors also reorganized the derivation of the main results and streamlined the presentation of numerical experiments. In addition, they have discussed subsequent developments in the field, increasing the size of the bibliography from 40 to 63, and highlighted some current challenges.

We also note that the results in the original SINUM article formed part of the 2017 Columbia University Ph.D. dissertation of the first author, Xiaochuan Tian, who was subsequently awarded an Association for Woman in Mathematics Dissertation Prize.

The Editors