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Error estimates of Lagrange–Galerkin moving mesh schemes for the one-dimensional convection-diffusion equation

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Adaptive moving mesh methods are highly effective for achieving high-accuracy numerical computations. However, their error analysis is nontrivial, since the movement of the mesh induces time dependence in the interpolation operator, which requires careful treatment when interchanging differentiation in time and integration in space. In this talk, we present a framework for Lagrangian finite element schemes with moving meshes for convection-diffusion problems. We introduce a concrete moving mesh scheme for the one-dimensional case and discuss its fundamental properties together with rigorous optimal error estimates. Numerical experiments demonstrate that the proposed approach can accurately capture sharp spike-type solutions. This talk is given based on the paper [1].

Keywords: Moving mesh, error estimates

MSC2020: 65M12, 65M20, 65M50

References

- [1] K. Putri, T. Mizuochi, N. Kolbe, and H. Notsu. Error estimates for first- and second-order Lagrange–Galerkin moving mesh schemes for the one-dimensional convection-diffusion equation. *Journal of Scientific Computing*, 101:37, 2024.