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A Characteristic-Based, Spectral Element Method for Moving-Domain Problems[1] SAUMIL PATEL, Argonne National Laboratory, PAUL FISCHER, Argonne National Laboratory University of Illinois at Urbana-Champaign, ANANIAS TOMBOULIDES, Argonne National Laboratory Aristotle University of Thessaloniki, MISUN MIN, Argonne National Laboratory — In this paper, we present a characteristic-based numerical procedure for simulations of incompressible flows in domains with moving boundaries. Our approach utilizes an operator-integration-factor splitting (OIFS) technique to help produce an efficient and stable numerical scheme. Using the spectral element method (SEM) and an arbitrary Lagrangian-Eulerian (ALE) formulation, we investigate flows where the convective acceleration effects are non-negligible. Several examples, ranging from laminar to turbulent flows, are considered. Comparisons with a standard, semi-implicit time-stepping procedure illustrate the improved performance of the scheme.

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