AN ADAPTIVE AND QUASI-CONSERVATIVE SEMI-LAGRANGIAN
ADVECTION-DIFFUSION ALGORITHM

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Abstract

The combination of advection dominated flows with physically or chemically induced
diffusion of a constituent often poses problems to numerical schemes with respect of sta-
bility and accuracy. In this presentation we explore the efficacy of combining adaptive
mesh refinement for local accuracy; semi-Lagrangian time discretization for stability, a
flux-based formulation and discretization for (quasi) conservative numerical properties,
and an advection-diffusion split form for solving the corresponding problem. The re-
sulting algorithm is simple and efficient. Several tests are conducted to demonstrate its
properties.

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