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A semi-Lagrangian scheme for optimal navigation problems on unstructured grids

Abstract

Semi-Lagrangian schemes are characteristic-based schemes commonly employed to treat advection terms in time dependent PDEs. They preserve stability under large Courant numbers, hence they may be appealing in many practical situations. However, the need of locating the feet of characteristics may cause a serious drop of efficiency in the case of unstructured space grids. In this talk, I will present an in-depth analysis of the main recipes available for characteristic location on unstructured grids, and propose a simple but effective technique to speed-up this phase of the computation, exploiting additional information related to the advecting vector field of the underlying PDE. Finally, I will show the results obtained by applying the proposed scheme to different optimal navigation problems, both in the case of stationary and non stationary drift fields.

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