



Martin Schreiber

Du 22 juin 2022 au 22 juin 2022

Université de Grenoble Alpes

Web page : <https://www.martin-schreiber.info/> | 

Title: A Brief Glimpse on Emerging Time Integration Methods for Weather and Climate Simulations

Abstract: Weather and climate simulations face new challenges due to changes in computer architectures caused by physical limitations. From a pure computing perspective, algorithms are required to cope with stagnating or even decreasing per-core speed and increasing on-chip parallelism. These trends will continue and already led to research on partly disruptive mathematical and algorithmic reformulations of dynamical cores, e.g., using additional parallelism along the time dimension.

This presentation provides an overview and introduction of a variety of promising newly developed and evaluated time integration methods for equations related to prototypical dynamical cores, all aimed at improving the ratio of wall clock time vs. error: Rational Approximation of Exponential Integration (REXI), Parallel Full Approximation Scheme in Space and Time (PFASST) and Semi-Lagrangian methods combined with Parareal. We get improved time-vs.-error rates, but sometimes with additional challenges on the way which needs to be further overcome. Overall, our results motivate further investigation and combination of these methods for operational weather/climate systems.