Contribution ID: **26** Type: **Contributed Talk**

Phase Averaged Deferred Correction for Multi-Timescale Systems

Wednesday 9 October 2024 09:30 (15 minutes)

In the atmosphere, fast oscillations such as gravity waves coexist with slow features such as geostrophic vortices. Numerical modelling of the fast and slow dynamics requires a small time step and long simulation time, which is computationally costly. Phase averaging filters out the fast oscillations whilst capturing their effect on the slow features, allowing for larger time steps.

We propose a modification to the phase averaging method called Phase Averaged Deferred Correction (PADC). PADC iteratively predicts and corrects an initial phase averaged solution. In contrast to classical deferred correction methods, we use a decreasing time averaging window to capture faster oscillations and increase solution accuracy. Furthermore, predictions and corrections are stacked and computed in parallel, reducing computational cost. We demonstrate the efficacy of PADC applied to a rotating shallow water system, comparing our results to those of phase averaging and direct simulation.

Primary authors: COX, Michael (Durham University); Dr KAFIABAD, Hossein (Durham University)

Presenter: COX, Michael (Durham University)

Session Classification: Time-Scale Interactions & Balancing