Improving the accuracy of TRiSK-type schemes

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Abstract

TRiSK-type spatial discretizations are widely used in numerical models for geophysical fluid dynamics, including several operational atmospheric and oceanic models (MPAS-O, DYNAMICO, PAM). They have many desirable properties, including energy conservation, PV compatibility and freedom from (most) spurious computational modes. However, their numerical accuracy can be poor, especially on unstructured spherical grids. In this talk we will discuss recent progress towards fixing this, based on an understanding of TRiSK-type schemes as a type of discrete exterior calculus (DEC). In particular, we will leverage alternative Hodge star and wedge product operators from the DEC literature, which do not interfere with the desirable properties of TRiSK-type schemes.

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