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A new, generalized discontinuous approach in numerical modeling: principles and applications

Florent Henri Lyard
CNRS, LEGOS, Toulouse, France (florent.lyard@legos.obs-mip.fr)

Discontinuous methods for ocean modeling exist for many years now, such as discontinuous Galerkin or finite differences. A new approach, that can be seen as an extension of distribution theory, has been developed in the aim to offer a general and formal frame to unify most of the existing types of discretisation and numerical methods used in ocean modeling. The basics of this new approach, based on the definition of a new integral measure that is compatible with the usual integration rules, will be presented. Its applications to some typical numerical issues (such as the pressure gradient inconsistency in generalized sigma models) will illustrate its potential interest for numerical modeling, either to design new numerical schemes or to analyze existing ones.