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A new efficient LES model and suitable test-cases

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As part of a new climate model development effort (CliMa), an efficient LES model has been developed at MIT in order to simulate turbulent flow in simple geometry configurations.

One of the target application is to explicitly resolve turbulent boundary layers in a wide range of oceanic conditions in order to help to improve mixing parameterizations used in GCMs.

The model, Oceananigans, is based on similar numerics to the MIT General Circulation Model (MITgcm), but relies on a more efficient modal pressure solver applicable to simple domain geometries.

Written in Julia, Oceananigans runs efficiently on both CPUs and GPUs and includes several recent LES sub-grid scale closures.

A brief overview of the model is presented and results from few standard LES test-cases show good agreement with either analytic solution or well established model results.

In the broader context of model test-cases, this illustrates that for idealized configurations with simple geometry, reliable tests are available to validate and evaluate individual model component. The need for robust tests addressing more complex, ocean science motivated, modeling problems is briefly discussed from the experience gained with MITgcm.

Do you need an official invitation letter?

No

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