Un modèle bidomaine aux équations primitives en Océanographie physique

This study concerns numerical simulations carried out following the elaboration of an oceanological multidomain model. These simulations demonstrate the value of such a model for physical oceanography. A simplified, two-domain version of the multidomain model is presented. It is based on a computer code which solves the Navier-Stokes and temperature equations in the three dimensions of space for an incompressible fluid in accordance with the hydrostatic approximation and Boussinesq's assumption. This model permits a zoom on a specific region of the spatial domain, where the primitive equations are solved, with a mesh refinement, in order to correct by feedback the global numerical solution. It includes a nested procedure which manages the resolution of the differential problem on two domains. This technique of domain decomposition forms part of the numerical methods of domain refinement with full overlapping. The model is tested by the simulation of a barotropic modon, an analytic solution, of the quasigeostrophic potential vorticity equation, adequately representative of an oceanic vortex. The numerical solutions obtained with the monodomain and bidomain model are compared with each other by calculation of the errors commited in the two cases relative to the analytic solution. It appears that this interactive nested technique permits correct management of open boundaries conditions. The zoom performed on a region of the spatial domain efficiently corrects the global solution compared with that obtained by the basic monodomain model.

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