College of Science and Technology

Topics in Applied and Computational Science

Announcing

A COS 740 Seminar

Friday, October 26, 2007 at 2:00 pm

SH 303

at The University of Southern Mississippi

Speaker: V.M. Kamenkovich and D.A. Nechaev

The University of Southern Mississippi

Title: On the time-splitting scheme used in the Princeton Ocean Model

Abstract:

It is well known that perturbations in the ocean propagate with substantially different speeds. The phase speed of the fastest propagating perturbation imposes a restriction on the size of time steps used in the explicit finite-difference models of the ocean circulation. Therefore for the construction of an efficient explicit finite-difference scheme one needs to somehow separate fast and slow processes so that not to solve all governing equations with the time step dictated by the fastest propagating perturbations. This procedure is conventionally referred to as time-splitting and is utilized in many community Ocean General Circulation Models (OGCM). To be specific we will examine properties of the time-splitting procedure used in the Princeton Ocean Model. For this purpose we will consider the simplest linear nonrotating two-layer model of constant depth and approximate the differential equations of this model by the finite-difference scheme analogous to that applied in the POM. The exact solution of the system of differential equations of this simplest model is easily found and will be used for the comparison with approximate solutions. First, we will study the mode separation problem for differential equations of our model. We will formulate two types of the 'time-splitted' system of differential equations based on different definitions of slow components of the external mode. Then we will examine the solutions of these systems and compare them with the exact solutions to find the conditions of their applicability. Second, we will analyze the linear stability of the finite-difference scheme approximating our simple model.

Further Information

Further details and information about this and other departmental activities is available online at http://www.math.usm.edu/bulletin_board/.