

ANNOUNCEMENTS

Calendar Notes

by Robert Borrelli

There are several upcoming events of interest to the Consortium.

- First off, I will moderate two three-hour sessions of the ICTCM '93 which will take place November 4-7, 1993, at Parsippany, NJ. Speakers include Bill Boyce, Bob Devaney, and Paul Davis in the first session which is entitled "Differential Equations: Technology and the Curriculum", 1:00 p.m. - 3:45 p.m., on Saturday, November 6th. The second session is entitled "Modeling in the ODE Curriculum" and takes place on Sunday, November 7th, 8:00 a.m. - 10:45 a.m. (there is a misprint in the Advance Program). Speakers at this session are Mike Moody, Martin Braun, Chris Arney and Tony Danby. Each of these sessions will have a 45-minute discussion/question-and-answer period following presentations by the speakers.
- Margie Hale of Stetson University has organized a panel discussion entitled "Asking Questions: Using Technology to Engage the Mind". The panelists will approach the subject in the light of specific undergraduate mathematics courses (including ODEs). Among the panelists are Beverly West, George Mitchell, Gary Sherman, Gareth Williams, and James Conklin.
- At the MAA/AMS annual meeting which takes place January 12-15, 1994 in Cincinnati there will be a special session entitled "New Methods for Teaching Elementary Differential Equations." Organized by Gil Proctor, there will be some 28 speakers (so far) divided between Friday morning (January 14) and Saturday afternoon (January 15). Included among the speakers are Gil Proctor, Bill Boyce, Beverly West, Bob Borrelli, Court Coleman, and Steve Kennedy as well as the Consortium Workshop Participants Dave Lomen, John Polking, Herman Gollwitzer, Ed Spitznagel, Mark Farris, and Fred Barber.

Workshop Results:

Washington State University

(June 12-18, 1993)

Michael Kallaher and Michael Moody directed a remarkably successful workshop on ODE experiments. The twenty-eight faculty participants came from two and four year colleges as well as large universities from around the country. As in all of the workshops sponsored by the Consortium for Ordinary Differential Equations Experiments with NSF backing, the participants all teach, or are about to teach, introductory differential equations. The workshops used Mathematica, Maple V.2, Matlab and XPP on a cluster of DEC System 5400 computers. Here are a few of the experiments the participants wrote and tested:

- "*The Case of the Aging Springs - or Why You Should Replace Your Shocks*" by Edmondson, Gamon, & Vanisko
- "*Experimenting with the Logistic Equation Using Mathematica*" by Steve Clark, Scott Coble, Tim Randolph

- “How to Balance a Stick When Walking in a Straight Line” by Boyd Cardon, Gene Enneking, Fred Wilke
- “Interactions and Reactions: An Introduction to Analysis of 2-D Nonlinear Dynamics” by Jeffery Palmer and Wei-Jen Harrison.

St. Olaf College

(June 20-25, 1993)

Arnold Ostebee and Steven Kennedy organized and hosted the workshop, Computer Experiments in Ordinary Differential Equations, one of the six workshops supported by the NSF and run by the Consortium for Ordinary Differential Equations during the summers of 1992, 1993, and 1994. The twenty-five participants used a variety of solvers on a variety of platforms, reported that they had a great time and learned a lot, and designed a number of interesting experiments for an ODE computer lab. Here are the titles of some of the experiments (and their authors):

- “The Average Distance Between Points in a Disk” by Steven R. Dunbar & Richard Bernatz
- “Mining Carbonite in the Degan System” by Jerold Mathews
- “A Plant-Herbivore Model; or Why is the World Green?” by Jon L. Johnson & Lisa Holden
- “Can One Exceed Terminal Velocity?” by Fink, Freeman, & Hampton.

Some of the experiments from these workshops will appear in later issues of **C·ODE·E**.

A Polluted Lake

Mahmoud fath El-Den

Ft. Hays State University

Hays, KS

mahmoud@ksuvm.ksu.edu

Computers and ODEs: When teaching an introductory differential equations course, we usually use suitably cooked functions and limit the applications to those that result in not-so-hard integrals. Thanks to recent computer technology and the mathematical software library (**MacMath, Mathematica, Maple, Derive,...**), we can consider more realistic problems, and let the computer do many of the long, tedious computations. It is still very important that the students know how, and why, the methods

work. Then, they are motivated to use these computational packages to save time and effort, and concentrate instead on the ideas and the theory behind the computations.

Computers also make students excited and willing to learn more math. It is believed that introducing our students to easy-to-use software is best accomplished at the differential equations level. By then, the students already have had a good dose of mathematical analysis and logical thinking, which in turn gives them a chance to appreciate the role mathematics plays in our life.

In this paper, we will consider the familiar problem of pollution in a lake in a relatively general setting (see [1] for another version of this model). A computer package will be used to find and investigate the solution of the differential equation that models the problem with different initial conditions. By bringing this kind of technology into the