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PUBLIC LECTURE ON MATHEMATICAL EXPERIMENT ON A SPACE SHUTTLE

A world-renowned mathematician, Professor Paul Concus, of the University of California at Berkeley, is going to report on his latest experimental findings on the U.S. space shuttle Columbia at a public lecture at the Chinese University of Hong Kong next week.

Organized by the Mathematics Department of the Chinese University, the lecture will be held at 4:30 p.m. on April 29 (Thursday) at L5, Science Centre on the University's Shatin campus.

His talk will focus on his joint work with Prof. Robert Finn of Stanford University on the shape of the liquid surface in a container under zero gravity. The exciting results were confirmed by an experiment done in the space shuttle Columbia last June. A video of the shuttle experiment will also be shown.

Prof. Concus studies the shape of a liquid surface in a container. Mathematically, it can be described by a nonlinear differential equation involving the volume of the liquid, the contact angle between the liquid surface and the container wall, the shape of the container and gravity. In our daily life, liquid surfaces we see in a glass, a coffee cup, a beer mug or a bathtub are all basically flat.

However, the problem is extremely interesting and contradictory to one's intuition of daily experience, when the gravity is zero. This is the case on a spaceship. From the study of the relevant differential equation, Prof. Concus and Prof. Finn proved a striking result : for some symmetric container, the liquid surface is not symmetrical. What is then the shape of the liquid surface? The differential equation is very difficult to solve explicitly giving no information about the shape. Computer simulations were done to find numerically the shape of the liquid surface. There are three possibilities. Which of these three will actually occur? This has to be confirmed by an experiment, which can only be done in space when the gravity is zero. The experiment was done during the flight of the Columbia on June 25, 1992. The asymmetrical liquid surface shape was confirmed. Works are being done to compare the experimental results with the computer simulations.

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