Joint Event

PHYSICAL MATHEMATICS SEMINAR

AND

NUMERICAL METHODS FOR PDEs SEMINAR

Traveling-Standing Water Waves and Microseisms

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ABSTRACT:

We study a two-parameter family of solutions of the surface Euler equations in which solutions return to a spatial translation of their initial condition at a later time. Pure standing waves and pure traveling waves emerge as special cases at fixed values of one of the parameters. We find many examples of wave crests that nearly sharpen to a corner, with corner angles close to 120 degrees near the traveling wave of greatest height, and close to 90 degrees for large-amplitude pure standing waves. However, aside from the traveling case, we do not believe any of these solutions approach a limiting extreme wave that forms a perfect corner.

We also compute nonlinear wave packets, or breathers, which can take the form of NLS-type solitary waves or counterpropagating wave trains of nearly equal wavelength. In the latter case, an interesting phenomenon occurs in which the pressure develops a large DC component that varies in time but not space, or at least varies slowly in space compared to the wavelength of the surface waves. These large-scale pressure zones can move very rapidly since they travel at the envelope speed, and may be partially responsible for microseisms, the background noise observed in earthquake seismographs.

TUESDAY, OCTOBER 1, 2013
2:30 PM
Building E51, Room 149

Reception following in Building E17, Room 401A
(Math Dept. Common Room)

http://math.mit.edu/pms

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