

Analysis and Applied Mathematics Seminar

Interaction of modulated water waves of finite depth

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Abstract: In this talk we consider the water wave problem of finite depth as a nonlinear dispersive system. Motivated by this feature, we are interested in the macroscopic dynamics of the envelopes of small, macroscopically amplitude-modulated fixed carrier waves, the latter being plane wave solutions of the linearized problem. More specifically, we want to know whether some sort of interaction of different (modulated) carrier waves can be observed macroscopically. For pure gravity waves such a macroscopic interaction can be observed only for the next-to-leading order corrections of the macroscopic amplitudes and a relevant system of modulation equations is derived. This system is then justified by employing the stability of the original water wave problem, as established by Lannes in his 2013 book. Time permitting, we discuss also the completely different situation in the case of capillary-gravity water waves, where for resonant carrier waves macroscopic interactions can be observed for the leading order amplitudes and where a stability result for the original water wave problem has to take into account the second-order differential operator of the surface tension.

Monday, January 28 at 4:00 PM in 636 SEO
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