Flow underlying coupled surface and internal water waves

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Abstract

Determining the underlying fluid motion generated by a wave propagating on an interface is an intriguing area of mathematical research which has important practical implications in the broad field of fluid mechanics. In this talk I present recent results concerning the fluid motion induced by internal water waves, coupled with surface waves, in the linear setting for two irrotational fluid layers. A detailed qualitative description of the underlying wave-field kinematics is achieved using a phase-plane analysis, which is dependent on a variety of physical-flow parameters. As a by-product we elucidate the fluid particle trajectory patterns for a range of coupled wave motions. This is joint work with Gabriele Villari.