Mathematics, Statistics, and Computer Science **@ UIC**

Analysis and Applied Mathematics Seminar

Existence of large-amplitude steady stratified water waves

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Abstract: We consider 2D steady water waves with heterogeneous density. The presence of stratification allows for a wide variety of traveling waves, including fronts, so-called generalized solitary waves with ripples in the far field, and even fronts with ripples! Among these many possible wave patterns, we prove that for any smooth choice of upstream velocity and monotone streamline density function, there always exists a continuous curve of solitary waves with large amplitude, which are even and decreasing monotonically on either side of a central crest. As one moves along this curve, the horizontal fluid velocity comes arbitrarily close to the wave speed.

We will also discuss a number of results characterizing the qualitative features of solitary stratified waves. In part, these include bounds on the Froude number from above and below that are new even for constant density flow; an a priori bound on the velocity field and lower bound on the pressure; a proof of the nonexistence of monotone bores for stratified surface waves; and a theorem ensuring that all supercritical solitary waves of elevation have an axis of even symmetry. This is a joint work with Samuel Walsh and Miles Wheeler.

Monday, October 24 at 4:00 PM in SEO 636