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Joel Jacob Klipfel* (jjk1223@g.uky.edu), Department of Mathematics, 719 Patterson Office Tower, Lexington, KY 40506-0027, and **Peter A Perry** and **Yilun Wu**. *Direct Scattering Map for the Intermediate Long Wave Equation*. Preliminary report.

In the 1970's and 1980's, Kodama, Ablowitz and Satsuma, together with Santini, Ablowitz and Fokas, developed the formal inverse scattering theory of the Intermediate Long Wave (ILW) equation and explored its connections with the Benjamin-Ono (BO) and KdV equations. The ILW equation

$$u_t + \frac{1}{\delta}u_x + 2uu_x + Tu_{xx} = 0,$$

models the behavior of long internal gravitational waves in stratified fluids of depth $0 < \delta < \infty$, where T is a singular operator which depends on the depth δ . In the limit $\delta \rightarrow 0$, the ILW reduces to the Korteweg de Vries (KdV) equation, and in the limit $\delta \rightarrow \infty$, the ILW (at least formally) reduces to the Benjamin-Ono (BO) equation.

While the KdV equation is very well understood, a rigorous analysis of inverse scattering for the ILW equation remains to be accomplished. There is currently no rigorous proof that the inverse scattering procedure outlined by Kodama *et al.* solves the ILW, even for small data. In this talk, I present a progress report on joint work with Peter Perry, Yilun Wu, and myself on studying the direct scattering map for the ILW as a first step to a rigorous analysis of the inverse scattering method. (Received August 21, 2018)