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Weakly nonlinear models for internal waves SHENGQIAN CHEN, University of Wisconsin at Madison, ROBERTO CAMASSA, Department of Mathematics, University of North Carolina at Chapel Hill — In the class of weakly nonlinear models for internal waves, some systems are solvable by the Inverse Scattering Transform (IST). However, these models have the drawback of being ill-posed, or highly oscillatory wavetrains may develop in the solution such as for the Korteweg de Vries equation, thereby preventing standard numerical approaches from achieving the desired accuracy. In this talk, we propose a regularized version of the ill-posed two-layer Kaup, and the solitary wave solution for the new model is provided. The particular nature of the ill-posedness of Kaup's system proves to be rather challenging for designing numerical solution algorithms, a situation that is completely by-passed by the new regularized Kaup system. We provide numerical evidence showing that our regularization has little influence on the prediction offered by IST: the soliton content of initial data based on Kaup's system is left basically intact by its regularized counterpart, as tested by the numerical simulations of the new model.

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