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Instabilities of coupled wave packet systems[1] HOK SHUN CHIU, KWOK CHOW, Mechanical Engineering, University of Hong Kong — Propagation of wave packets in layered or continuously stratified fluids will typically lead to coupled, nonlinear Schrodinger equations (CNLS). The competition between dispersion and nonlinearity will be crucial. A novel instability can arise from cross phase modulation (XPM), or the effect on a wave packet due to the presence of the other one. XPM in the hydrodynamic context is now considered from several perspectives. In the long wave regime governed by the extended Korteweg de Vries system, CNLS are derived by multiple-scale expansions and modulation instabilities (MI) of plane waves are studied. This will reveal new energy transfer mechanism. Secondly, from a scientific perspective, special, integrable higher order CNLS are considered and the presence of MI is examined. This is critical as higher (or fourth) order effects must be considered when the wave slope is sufficiently large.

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