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Four wave interactions for internal waves JEAN-MARC CHOMAZ, LadHyX, CNRS-Ecole polytechniqu, SABINE ORTIZ, Unit de Mcanique, Ecole Nationale Suprieure de Techniques Avances, Paris, LADHYX, CNRS-ECOLE POLYTECHNIQUE TEAM, UNIT DE MCANIQUE, ECOLE NATIONALE SUPRIEURE DE TECHNIQUES AVANCES, PARIS TEAM — Triadic instability is a very generic mechanism by which a primary wave of finite amplitude is destabilized by two secondary waves (daughter waves) forming a resonant triad. For gravity waves in the ocean, as shown by Phillips, O.M. (UPC, 1967), resonant triads form several continuous branches, which can be represented in two dimensions as resonant lines in the plane of the wave vector of one of the secondary waves. We show here that the crossing of two of these branches radically modifies the nature of triadic instability by coupling, no longer two daughter waves, but three that form two triads sharing one same wave. Instability is then reduced for the triad unstable in classical theory while the second triad, stable according to classical theory, is strongly destabilized. Building on McEwan, A.D. & Plumb, R.A. (Dyn. Atm. & Oceans, 1977), we show that this modification of triadic instability affects a finite region around the crossing point of resonant branches in the plane of wave vectors, region whose extent increases very rapidly as the amplitude of the primary wave increases. The direct calculation of instability modes by a Floquet method shows that, even for a very small amplitude of the primary wave (Froude number of about 0.01), the deviation from the classical theory.

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