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Dynamical instabilities obtained with initially immiscible coupled Bose-Einstein condensates

Wednesday, 25 September 2024 09:00 (30 minutes)

An investigation considering the emergence of Rayleigh-Taylor (RT) and Kelvin-Helmholtz (KH) instabilities, which occur in initially immiscible configuration of homogeneous Bose-Einstein condensates confined in a two-dimensional circular box, will be reported. For the binary mixture, it has been considered the rubidium isotopes ^{85}Rb and ^{87}Rb . As verified, more sound wave generations are found to appear in the RT instability than in the KH instability. Further, it will be also reported instabilities that occur in the binary mixture when centrally and axially phase separated states are submitted to sudden transitions from immiscible to miscible regimes by reducing the inter-species interactions. In all the reported cases, it will be shown the associated kinetic energy spectra as functions of the wave number k , which roughly follow the $k^{-5/3}$ and k^{-3} scaling behaviors at specific time intervals.

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