

Title:

Robust energy transfer mechanism via precession resonance in nonlinear turbulent wave systems

Abstract:

A robust energy transfer mechanism is found in nonlinear wave systems, which favours transfers towards modes interacting via triads with nonzero frequency mismatch, applicable in meteorology, nonlinear optics and plasma wave turbulence. We emphasise the concepts of truly dynamical degrees of freedom and triad precession. Transfer efficiency is maximal when the triads' precession frequencies resonate with the system's nonlinear frequencies, leading to a collective state of synchronised triads with strong turbulent cascades at intermediate nonlinearity. Numerical simulations confirm analytical predictions.

Reference:

M. D. Bustamante, B. Quinn, Dan Lucas, Robust energy transfer mechanism via precession resonance in nonlinear turbulent wave systems, Phys. Rev. Lett. 113, 084502 (2014)