

Abstract Submitted
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Energetic Particle Modes: example of Autoresonance and Superradiance in fusion plasmas¹ FULVIO ZONCA, ENEA, Frascati, LIU CHEN, IFTS, ZJU and UCI — Energetic Particle Modes (EPM) [1] are resonant non-normal modes born out of the shear Alfvén wave (SAW) continuous spectrum when the energetic particle (EP) drive overcomes continuum damping in nonuniform fusion plasmas. Their nonlinear evolution is characterized by radially convective amplification of the EPM wave-packet and secular EP radial transports [2]. Here, we demonstrate that EPM-EP phase locking [2,3] is an example of Autoresonance [4] in fusion plasmas; and that the corresponding EPM-EP nonlinear dynamics has interesting analogies with Superradiance [5]. These complex nonlinear behaviors are described, in a simple yet practically relevant limiting case, by a complex Nonlinear Schrödinger Equation.

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