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Adiabatic invariance for eigenmodes and continuum modes in nonuniform plasmas MAKOTO HIROTA, SHINJI TOKUDA, Japan Atomic Energy Agency — Adiabatic invariance of wave action is investigated for general eigenmodes and continuum modes by exploiting the variational principle for linearized dynamical systems. This theory applies to various dissipationless plasma models and serves to explain quasi-linear evolution of modal behavior, for which the standard eikonal limit is not always suitable. Given a sufficiently slow evolution of the background fields, the wave action (or the action variable) attributed to each mode is conserved as long as the corresponding discrete or continuous spectrum is isolated from other spectra and zero frequency. The resonant coupling allows exchange of wave action among these modes. The invariance of wave action is demonstrated for the case of Alfvén and sound resonances in the MHD model, which leads to a new wave-quantum interpretation of the continuum damping and the resonant growth. The sign of the wave action generally determines whether the resonant instability occurs or not.

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