682

Accession Number

12366896

Author

Niculescu EC. Radu A.

Author Unabbreviated

Niculescu E. C.; Radu A.

Author/Editor Affiliation

Niculescu EC. Radu A. : Department of Physics, "Politehnica" University of Bucharest, Bucharest 060042, Romania

Title

Tunneling time correction to the intersubband optical absorption in a THz laser-dressed GaAs/Al_xGa_{1-x}As quantum well

Source

European Physical Journal B, vol.80, no.1, March 2011, 73-82. Publisher: EDP Sciences and Springer-Verlag, France.

Abstract

Tunneling effect on the intersubband optical absorption in a GaAs/Al x Ga₁₋x As quantum well under simultaneous presence of intense non-resonant laser and static electric fields is theoretically investigated. Based on the shooting method the quasi-stationary energy levels and their corresponding linewidths are obtained. By considering the joint action of the two external fields the linear absorption coefficient is calculated by means of Fermi's golden rule and taking into account the intersubband relaxation. We found that: (i) the linewidth broadening due to the electron tunneling has an appreciable effect on the absorption spectrum; (ii) a constant relaxation time adopted in the previous studies could not be justified even for moderate electric fields, especially in the laser dressed wells. Our model predicts that the number of absorption peaks can be controlled by the external applied fields. While in the high-electric fields the excited states become unbounded due to a significant tunneling of the electrons, for high laser intensities and low/moderate electric fields the absorption spectrum has a richer structure due to the laser-generated resonant states. The possibility of tuning the resonant absorption energies by using the combined effects of the static electric field and the THz coherent radiation field can be useful in designing new optoelectronic devices. (39 References).