Magneto-Stark effect on exciton in parabolic band $GaAs/Ga_{0.3}Al_{0.7}As$ quantum well heterostructure

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The effect of applied crossed electric and magnetic fields on the heterostructure semiconductor is used in the scientific investigation on electronic and optical exciton properties. The aim of this work is to study the magneto-Stark effect for confined excitons in single $GaAs/Ga_{0.3}Al_{0.7}As$ QWs. The magnetic field **B** is taken as perpendicular to the z-growth direction of the heterostructure, whereas the applied electric field E is along the z-growth direction. The data we used includes intrinsic parameters of the systems and manipulated external magnetic and electric fields. In the model equation, we utilized variational non-degenerate parabolic band approximations using 1 s hydrogen like ion ground state to ($\Delta = 0$) that is, overlap e-h calculate the position at which spatial distance b/n electron and hole ($\Delta = 0$) occurred $\mathbf{B} \longrightarrow \infty$ and $\mathbf{E} \longrightarrow 0$ we also used Matlab version R2017a to simulate our result as depicted in graphs. As electric field (**E**) increases along growth z-direction, the spatial distance (Δ) increases due to a reduction of Coulomb interaction b/n eh, whereas increasing the magnetic field (**B**) perpendicular to the growth z-direction has the reverse effect and shrinks the wave function in the QW plane. This shrinkage enhances the eh interaction, which in turn, more likely localizes the electron within the same QW as the whole and thus keeps the ground state in a direct exciton which is efficient in photonics.