

# Nonlinear waves in GaAs semiconductor

U. M. Abdelsalam\*

*Department of Mathematics, Faculty of Science,  
Fayoum University, Egypt and Leeth University College,  
Umm Al-Qura University, Saudi Arabia*

F. M. Allehiany<sup>†</sup>

*Department of Mathematics, Faculty of Applied Sciences,  
Umm Al-Qura University, Saudi Arabia*

W. M. Moslem<sup>‡</sup>

*Department of Physics, Faculty of Science,  
Port Said University, Port Said 42521,  
Egypt; Centre for Theoretical Physics,  
The British University in Egypt (BUE), El-Shorouk City, Cairo, Egypt*

(Dated:)

## Abstract

Generation of nonlinear waves in electron-hole GaAs semiconductor plasma is examined. For this purpose, the reductive perturbation method is employed to the basic equations obtaining Gardner equation. The latter has been solved using an extended homogeneous balance method to obtain a set of analytical solutions including solitary wave solution. The effects of different physical parameters on the nonlinear structures are examined.

---

\*Electronic address: [usama.ahmad@rub.de](mailto:usama.ahmad@rub.de), [maths\\_us@hotmail.com](mailto:maths_us@hotmail.com)

<sup>†</sup>Electronic address: [allehiany\\_faiza@hotmail.com](mailto:allehiany_faiza@hotmail.com)

<sup>‡</sup>Electronic address: [wmmoslem@hotmail.com](mailto:wmmoslem@hotmail.com)