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## Existence of infinitely many solutions for coupled system of Schrödinger-Maxwell's equations

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## Abstract

In this paper we study the existence of infinitely many large energy solutions for the coupled system of Schrödinger-Maxwell's equations via the Fountain theorem under Cerami condition. More precisely, we consider the More general case and weaken conditions with respect to [2].

 ${\bf Keywords:} \ {\rm Schr}\ddot{o} {\rm dinger} {\rm Maxwell \ system \ , Cerami \ condition, Variational \ methods, \ Strongly \ indefinite \ functionals. }$ 

Mathematics Subject Classification [2010]: 35Pxx, 46Txx

## 1 Introduction

In this paper, we study the nonlinear coupled system of Schrödinger-Maxwell's equations

$$\begin{cases}
-\Delta u + V(x)u + \phi u = H_v(x, u, v) & \text{in } \mathbb{R}^3 \\
-\Delta \phi = u^2 & \text{in } \mathbb{R}^3 \\
-\Delta v + V(x)v + \psi v = H_u(x, u, v) & \text{in } \mathbb{R}^3 \\
-\Delta \psi = v^2 & \text{in } \mathbb{R}^3,
\end{cases}$$
(1)

where  $V \in C(\mathbb{R}^3, \mathbb{R})$  and  $H \in C^1(\mathbb{R}^3, \mathbb{R})$  which are satisfied in some suitable conditions. In the classical model, the interaction of a charge particle with an electromagnetic field can be described by the nonlinear Schrödinger-Maxwell's equations. In this article, we want to study the interaction of two charge particles Simultaneously with same potential function V(x) and different scalar potential  $\phi$  and  $\psi$  which are satisfied in suitable conditions. More precisely, we have to solve the system 1 if we want to find electrostatic-type solutions.

Existence of solutions are obtained via Fountain theorem in critical point theory. More precisely, in this paper we consider the more general case and weaken the condition of  $V_1$  in [2] and we assume that the potential V is non-periodic and sing changing. We assume the following conditions :

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