

## EXISTENCE AND MULTIPLICITY OF SIGN-CHANGING SOLUTIONS FOR A SCHRÖDINGER–BOPP–PODOLSKY SYSTEM

LIXIONG WANG — HAIBO CHEN — SENLI LIU

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ABSTRACT. In this paper, we deal with the following Schrödinger–Bopp–Podolsky system:

$$(P_\varepsilon) \quad \begin{cases} -\Delta u + u + \phi u = f(u), \\ -\Delta \phi + \varepsilon^2 \Delta^2 \phi = 4\pi u^2, \end{cases} \quad \text{in } \mathbb{R}^3,$$

where  $\varepsilon > 0$  and  $f$  is a continuous, superlinear and subcritical nonlinearity. By using a perturbation approach and the method of invariant sets of descending flow incorporated with minimax arguments, we prove the existence and multiplicity of sign-changing solutions of system  $(P_\varepsilon)$ . Moreover, the asymptotic behavior of sign-changing solutions is also established. Our results mainly extend the results in Liu, Wang and Zhang ([21], Ann. Mat. Pura Appl. 2016).

### 1. Introduction and main results

In this paper, we are concerned with sign-changing solutions to the following system:

$$(P_\varepsilon) \quad \begin{cases} -\Delta u + u + \phi u = f(u), \\ -\Delta \phi + \varepsilon^2 \Delta^2 \phi = 4\pi u^2, \end{cases} \quad \text{in } \mathbb{R}^3,$$

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*Key words and phrases*. Schrödinger–Bopp–Podolsky system; Sign-changing solutions; Perturbation approach; Invariant sets of descending flow; Asymptotic behavior.

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