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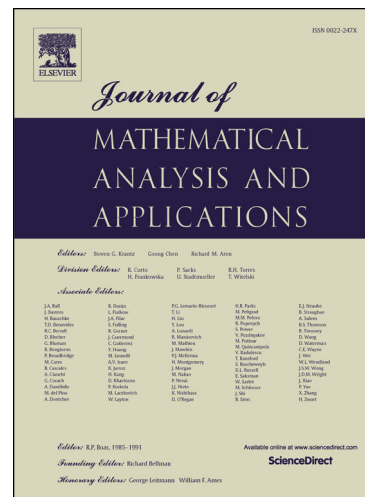
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# On The Standing Waves of Quantum Zakharov System

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## Abstract

In this work, we study the quantum Zakharov system which describes the non-linear interaction between high-frequency quantum Langmuir waves and low-frequency quantum ion-acoustic waves. We show the existence and the stability of the standing waves of quantum Zakharov system for the spacial dimensions  $d = 1, 2, 3$ .

*Keywords:* quantum Zakharov system, ground states, standing waves, stability

*2010 MSC:* Primary 35Q55; Secondary 35B35, 35Q40.

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## 1. Introduction

In this work we study the standing waves of the quantum Zakharov system for  $d = 1, 2, 3$ , which reads as follows

$$\begin{cases} i\partial_t E_{\varepsilon, \lambda} + \Delta E_{\varepsilon, \lambda} - \varepsilon^2 \Delta^2 E_{\varepsilon, \lambda} = n_{\varepsilon, \lambda} E_{\varepsilon, \lambda}, & (t, x) \in \mathbb{R} \times \mathbb{R}^d; \\ \lambda^{-2} \partial_t^2 n_{\varepsilon, \lambda} - \Delta n_{\varepsilon, \lambda} + \varepsilon^2 \Delta^2 n_{\varepsilon, \lambda} = \Delta |E_{\varepsilon, \lambda}|^2; \\ E_{\varepsilon, \lambda}(0) = E_0, \quad n_{\varepsilon, \lambda}(0) = n_0, \quad \partial_t n_{\varepsilon, \lambda}(0) = n_1, \end{cases} \quad (1)$$

where  $\varepsilon \in (0, 1]$  and  $\lambda \in [1, \infty)$  are constants,  $E_{\varepsilon, \lambda} : \mathbb{R} \times \mathbb{R}^d \rightarrow \mathbb{C}$  and  $n_{\varepsilon, \lambda} : \mathbb{R} \times \mathbb{R}^d \rightarrow \mathbb{R}$  are unknown functions, and  $E_0 : \mathbb{R}^d \rightarrow \mathbb{C}$ ,  $n_0 : \mathbb{R}^d \rightarrow \mathbb{R}$  and

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