# Quantum dissipative Zakharov model in a bounded domain

Igor Chueshov
*Kharkov National University, Kharkov 61022, Ukraine*
chueshov@univer.kharkov.ua

We consider an initial boundary value problem for a quantum version (introduced in [1]) of the Zakharov system arising in plasma physics:

$$\begin{cases} n_{tt} - \Delta\left(n + |E|^2\right) + h^2\Delta^2 n + \alpha n_t = f(x), \quad x \in \Omega,\ t > 0, \\ \\ iE_t + \Delta E - h^2\Delta^2 E + i\gamma E - nE = g(x), \quad x \in \Omega,\ t > 0. \end{cases}$$

Here $\Omega \subset \mathbb{R}^d$ is a bounded domain, $d \le 3$, $E(x,t)$ is a complex function and $n(x,t)$ is a real one, $h > 0$, $\alpha \ge 0$ and $\gamma \ge 0$ are parameters and $f(x)$, $g(x)$ are given (real and complex) functions. We also impose some boundary and initial conditions on $E$ and $n$.

We prove the global well-posedness of this problem in some Sobolev type classes and study properties of solutions. This result confirms the conclusion recently made in physical literature concerning the absence of collapse in the quantum Langmuir waves. (see a discussion in [2]). In the dissipative case the existence of a finite dimensional global attractor is established and regularity properties of this attractor are studied. For this we use the recently developed method of quasi-stability estimates (see [3, 4]). In the case when external loads are $C^\infty$ functions we show that every trajectory from the attractor is $C^\infty$ both in time and spatial variables. This can be interpret as the absence of sharp coherent structures in the limiting dynamics. For some details we refer to [5].

## References

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