On spectral properties of a Shrödinger operator with a negative parameter

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Abstract: In the paper a Shrödinger operator with a negative parameter

$$-\Delta + (-t^2 + ita(x) + c(x)) \tag{1}$$

is studied in the space $L_2(\mathbb{R}^n)$, where t is a parameter and $-\infty < t < \infty, i^2 = -1$. $\mathbb{R}^n$ is an n-dimensional Euclidean space $x \in \mathbb{R}^n$ $(x = (x_1, x_2, ..., x_n))$.

It is well known that when $t = 0$ the spectral properties of the Schrödinger operator $\Delta + c(x)$ are strongly dependent on the behavior of $c(x)$ on infinity. In this case, the spectral characteristics of the Schrödinger operator are well studied.

The discreteness of the spectrum and the estimates of approximate numbers (s-numbers) of a Schrödinger operator

$$-\Delta + q_1(x) + iq_2(x), (q_1(x) \geq 0, q_2(x) \geq 0)$$

have been studied.

In this paper such questions as:

a) the existence of the resolvent; b) the discreteness of spectrum; c) the estimates of the distribution function of singular values (s-values) will be studied for the operator (1).

Review of the literature shows that these questions for the Schrödinger operator with a negative parameter are insufficiently studied.

Keywords: resolvent, spectrum, singular values, Shrödinger operator

2010 Mathematics Subject Classification: 02.30.Jr, 02.30.Sa