Stability of ground states for logarithmic Schrödinger equation with a δ'-interaction

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We consider the one-dimensional logarithmic Schrödinger equation with a strong inhomogeneity represented by a singular point perturbation, the so-called δ'-interaction,

$$i\partial_t u + \partial_x^2 u + \gamma\delta'(x)u + u\,\mathrm{Log}\,|u|^2 = 0,$$

where $\gamma > 0$ and $u = u(x,t)$ is a complex-valued function of $(x,t) \in R \times R$. Global well-posedness is verified for the Cauchy problem in $H^1(R \setminus \{0\})$ and in an appropriate Orlicz space. In the attractive potential case ($\gamma > 0$), the set of the ground state is completely determined. More precisely: if $0 < \gamma \leq 2$, then there is a single ground state and it is an odd function; if $\gamma > 2$, then there exist two non-symmetric ground state. Moreover, we show that every ground state is orbitally stable via a variational approach (see [3, 4]).

References

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