

Multi-peak bound states for nonlinear Schrödinger equations

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In this paper we consider the study of standing wave solutions for a nonlinear Schrödinger equation. This problem reduces to that of finding nonnegative solutions of $-\Delta u - V(x)u + \epsilon(u) = 0$ in \mathbb{R}^N with finite energy. Here ϵ is a small parameter, \mathbb{R}^N is a smooth, possibly unbounded domain, ϵ is an appropriate superlinear function, and V is a positive potential, bounded away from zero. It is the purpose of this article to obtain multi-peak solutions in the "multiple well case". We find solutions exhibiting concentration at any prescribed finite set of local minima, possibly degenerate, of the potential. The proof relies on variational arguments, where a penalization-type method is developed for the identification of the desired solutions. © Elsevier, Paris.