学术报告

Computing ground states of spin-2 Bose-Einstein condensates by the normalized gradient flow

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Abstract： In this talk, an efficient and accurate numerical method is proposed to compute the ground state of spin-2 Bose-Einstein condensates (BECs) by using the normalized gradient flow (NGF) or imaginary time method (ITM). The key idea is to find three additional projection or normalization conditions based on the relations between chemical potentials for the five projection parameters used in the projection step of the NGF. Hence, together with the two other physical constrains given by the conservation of the total mass and magnetization, these five projection parameters can be uniquely determined. This allows one to successfully extend the NGF/ITM to compute the ground state of spin-2 BECs. The backward-forward finite difference method is then proposed to discretize the resulted NGF/ITM. Extensive numerical results on ground states of spin-2 BECs with ferromagnetic/nematic/cyclic interaction and harmonic/optical lattice/box potential in one/two dimensions are reported to show the efficiency of our method and to demonstrate some interesting physical phenomena. In addition, the ground states in a spatial uniform system are analytically solved out and analyzed, which is helpful to analyze the properties as well as simplify the computation of the ground states in spatial non-uniform system where single-mode-approximation is valid and useful to suggest initial data to efficiently initialize the NGF/ITM.

欢迎大家参加！