
Triple-parabola approximation for interfacial properties of binary mixtures of Bose-Einstein condensates

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Abstract

Accurate and useful analytic approximations are developed for order parameter profiles and interfacial tensions of phase-separated binary mixtures of Bose-Einstein condensates with repulsive inter-atomic forces. A triple-parabola approximation (TPA) is proposed, to represent closely the energy density featured in Gross-Pitaevskii (GP) theory. This TPA allows us to define a model, which is a handy alternative to full GP theory, while still possessing a simple analytic solution. The TPA offers an improvement over the recently introduced double-parabola approximation (DPA). In particular, a more accurate amplitude for the wall energy (of a single condensate) is derived and a more precise expression for the interfacial tension (of two condensates) is obtained, while also the interface profiles undergo a qualitative improvement [1].

1. Z. Deng, B. Van Schaeybroeck, C.-Y. Lin, N.V. Thu and J.O. Indekeu, *Physica A* **444**, 1027 (2016).

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