Determination of mixing or demixing state of a two-component BEC system[1] CHAO-CHUN HUANG, W. C. WU, National Taiwan Normal University — In a stable ultracold trapped two-component BEC system, it is shown that the condition $U_{11}U_{22} - U_{12}^2 > 0$ holds as long as the intra-species s-wave interactions g_{11} and g_{22} are both repulsive. Here $U_{ij} = g_{ij} \int d\mathbf{r} |\Psi_i(\mathbf{r})|^2 |\Psi_j(\mathbf{r})|^2$ with $\Psi_i(\mathbf{r})$ the wave function of species i. The condition is valid no matter the system is in a single-trap or in an optical lattice. Based on the variational approach, the condition has been applied to determine whether the system is in mixing or demixing state, both for the single-trap and optical-lattice cases. Phonon modes of the optical-lattice system are also shown to be intimately related to the above condition.

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