

## Ground State and Single Vortex for Bose-Einstein Condensates in Anisotropic Traps

XU Zhi-Jun<sup>1,2</sup> and CAI Ping-Gen<sup>1</sup>

<sup>1</sup> Department of Applied Physics, Zhejiang University of Technology, Hangzhou 310032, China

<sup>2</sup> The State Key Laboratory of Magnetic Resonance and Atomic and Molecular Physics, Wuhan 430071, China

(Received: 2006-6-26; Revised: )

**Abstract:** For Bose-Einstein condensation of neutral atoms in anisotropic traps at zero temperature, we present simple analytical methods for computing the properties of ground state and single vortex of Bose-Einstein condensates, and compare those results to extensive numerical simulations. The critical angular velocity for production of vortices is calculated for both positive and negative scattering lengths  $a$ , and find an analytical expression for the large- $N$  limit of the vortex critical angular velocity for  $a > 0$ , and the critical number for condensate population approaches the point of collapse for  $a < 0$ , by using approximate variational method.

PACS: 03.75.Lm, 05.30.Jp, 32.80.Pj

Key words: Bose-Einstein condensation, G-P equation, wave function, vortex formation

[\[Full text: PDF\]](#)

Close