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Shi Jin^{*} Minh-Binh Tran[†]

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Abstract

For the quantum kinetic system modelling the Bose-Einstein Condensate that accounts for interactions between condensate and excited atoms, we use the Chapman-Enskog expansion to derive its hydrodynamic approximations, include both Euler and Navier-Stokes approximations. The hydrodynamic approximations describe not only the macroscopic behavior of the BEC but also its coupling with the non-condensates, which agrees with the Landau two-fluid theory.

Keyword: Low and high temperature quantum kinetics; Bose-Einstein condensate; quantum Boltzmann equation; defocusing cubic nonlinear Schrodinger equation; quantum hydrodynamics limit.

MSC: 82C10, 82C22, 82C40.

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