

Abstract Submitted
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Countersuperflow in Binary Bose-Einstein Condensates with Rabi Coupling¹ HIROMITSU TAKEUCHI, AYAKA USUI, Osaka City Univ — Countersuperflow instability, dynamic instability of counterflow of miscible superfluids, was observed recently for the first time by Hamner et al. [1]. In the experiment, a countersuperflow of miscible two-component Bose-Einstein condensates (BECs) was realized in a quasi-one-dimensional trap by applying a magnetic gradient, which leads to a force in opposite directions for each component. A countersuperflow becomes dynamically unstable if the relative velocity between two superfluids exceeds a critical value and the instability causes characteristic density patterns forming solitons in quasi-one-dimensional systems. Very recently, Hamner et al. performed the experiment in a similar situation where a two-component BEC is subject to inhomogeneous Rabi oscillations between two pseudospin components under a magnetic gradient [2]. Motivated by the experiment, we investigated stability of countersuperflow with internal Josephson coupling, namely, Rabi coupling. We reveal the stability phase diagram of countersuperflow with Rabi coupling. [1] C. Hamner, J. J. Chang, P. Engels, and M. A. Hoefer, Phys. Rev. Lett. 106, 065302 (2011). [2] C. Hamner, Yongping Zhang, J. J. Chang, Chuanwei Zhang, and P. Engels, Phys. Rev. Lett. 111, 264101 (2013).

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