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Drag effects and vortex states in binary superfluids in optical lattices ALEXANDER MEYEROVICH, University of Rhode Island, ANATOLY KUKLOV, CUNY-Staten Island — Drag effects in two-condensate superfluids (A and B) in optical lattices are explored in strongly interacting limit. Mutual drag changes circulation quanta of vortices depending on the component concentration and interaction. This is a lattice analog of ^{3}He-HeII mixtures, in which the drag, proportional to the difference between bare and effective masses of quasiparticles, causes pressure-driven transitions in vortex charges [1]. The vortex binding in the hard-core boson limit relies, in contrast to the soft-core case studied in Monte Carlo simulations [2], on the vacancy-assisted tunneling. The model lattice for study of such effects is introduced. The variational and Monte Carlo calculations for the system, in which the tunneling for component A depends on the concentration of B, show the possibility of formation of the quasi-molecular condensate AB_m in addition to the condensates of A and B. A strong drag, leading to the composite vortices with multiple quanta, also becomes possible. The work is supported by NSF grants DMR-0077266 and ITR-405460001 and PSC-CUNY- 665560035. 1. A. E. Meyerovich, Phys. Rev. A **68**, 05162 (2003); Sov. Phys.-JETP **60**, 41 (1984) 2. A. Kuklov, N. Prokof'ev, and B. Svistunov, Phys. Rev. Lett. **92**, 030403 (2004)

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