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Energy dissipation in drag dynamics of one-dimensional Fermi systems JUN'ICHI OZAKI, MASAKI TEZUKA, NORIO KAWAKAMI, Kyoto University — We study the drag dynamics of a few fermions in a cloud of another fermion species in one-dimensional continuous systems, from interest in characteristic many-body effects in cold atom systems whose parameters change gradually in real time. We adopt the Fermi–Hubbard model and the time-dependent density matrix renormalization group method to calculate the energy cost needed to drag a trapped fermion cluster in a cloud of another type of fermions with contact interaction. We plot the energy cost per unit time as a function of the cloud density, and observe two peaks of the energy loss. This result provides, for example, the guide to reduce energy cost when one moves fermions in another type of fermion pool: move them independently or as a cluster. We explain the origin of the two peaks by using a schematic model which describes the detail of the excitation process. The peak in the small density region comes from the quasiparticle modes, while the other peak, in the large density region, corresponds to the collective mode of the whole cluster.

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