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Dynamics of small trapped one-dimensional Fermi gas under oscillating magnetic fields[1] X. Y. YIN, The Ohio State University, YANGQIAN YAN, Indiana University Purdue University Indianapolis, D. HUDSON SMITH, The Ohio State University — Deterministic preparation of an ultracold harmonically trapped one-dimensional Fermi gas consisting of a few fermions has been realized by the Heidelberg group. Using Floquet formalism, we study the time dynamics of two- and three-fermion systems in a harmonic trap under an oscillating magnetic field. The oscillating magnetic field produces a time-dependent interaction strength through a Feshbach resonance. We explore the dependence of these dynamics on the frequency of the oscillating magnetic field for non-interacting, weakly interacting, and strongly interacting systems. We identify the regimes where the system can be described by an effective two-state model and an effective three-state model. We find an unbounded coupling to all excited states at the infinitely strong interaction limit and several simple relations that characterize the dynamics. Based on our findings, we propose a technique for driving transition from the ground state to the excited states using an oscillating magnetic field.

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