Dark-soliton dynamics and snake instability in superfluid Fermi gases trapped by an anisotropic harmonic potential[1] WEN WEN, Department of Mathematics and Physics, Hohai University — We present an investigation of generation, dynamics and stability of dark solitons in anisotropic Fermi gases for a range of particle numbers and trap aspect ratios within the framework of the order-parameter equation. We calculate the periods of dark solitons oscillating in a trap, and find a good agreement with the results based on the Bogoliubov-de Gennes equations. By studying the stability of initially off-center dark solitons under various tight transverse confinements in the unitarity limit, we not only give the criterion of dynamical stability, but also find that the soliton and a hybrid of solitons and vortex rings can be characterized by different oscillation period. The stability criterion is not fulfilled by the parameters of the recent experiment of Yefsah *et* al.[Nature **499**, 426 (2013)]. Therefore, instead of a very slow oscillation as observed experimentally, we find that the created dark soliton undergoes a transverse snake instability with collapsing into vortex rings, which propagate in soliton-like manner with a nearly two times larger period.

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