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Lennard F Bakker* (bakker@mathematics.byu.edu) and **Mitchell Sailsbery** (mitchell.sailsbery@gmail.com). *Topological Existence of Periodic Orbits in a Two-Center Symmetric Pair Problem*. Preliminary report.

The two-center symmetric pair problem is a perturbation of the integrable Euler two-center problem, with the mass of the symmetric pair being the perturbation parameter. The perturbed problem is equivalent to a collinear three-center problem with the mass of the middle center being the parameter. Standard KAM theory shows that many of the quasiperiodic orbits in the Euler two-center problem persist for small values of the mass of the symmetric pair. Numerical evidence suggests that some of these quasiperiodic orbits as well as some periodic orbits persist for all values of the mass of the symmetric pair. We prove the persistence of a so-called planetary type periodic orbit for all choices of the mass of the symmetric pair. We also investigate the non-integrability of the two-center symmetric pair problem. (Received August 02, 2017)