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Periodic Orbits Close to Elliptic Tori and Applications to the Three-body Problem

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Abstract. We prove, under suitable non-resonance and non-degeneracy "twist" conditions, a Birkhoff-Lewis type result showing the existence of infinitely many periodic solutions, with larger and larger minimal period, accumulating onto elliptic invariant tori (of Hamiltonian systems). We prove the applicability of this result to the spatial planetary three-body problem in the small eccentricity-inclination regime. Furthermore, we find other periodic orbits under some restrictions on the period and the masses of the "planets". The proofs are based on averaging theory, KAM theory and variational methods.

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