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## Existence and minimization property of some satellite orbits for the restricted $n$ -body problem

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### **Abstract**

The  $n$ -body problem concerns the motion of  $n$  celestial bodies moving in space in accordance with Newton's law of universal gravitation. When one of the celestial bodies has zero mass, the problem is called a restricted problem. The orbit of an infinitesimal point mass for the restricted  $n$ -body problem is called a satellite orbit. Classical methods for proving existence of periodic satellite orbits include the analytic continuation method, power series method, equating the Fourier coefficients, and the fixed point method. In recent years variational methods have been successfully applied to the  $n$ -body problem to construct miscellaneous solutions. In this talk I will briefly describe some progress related to satellite orbits. In particular, I will outline a variational proof for the existence of some direct and retrograde periodic satellite orbits around symmetric relative equilibria.