

One of the most studied problems in celestial mechanics is the Circular Restricted Three Body Problem. The main theme of the project is to make a rigorous analysis of symmetric, periodic orbits Halo in the Sun-Jupiter and Earth-Moon systems. Existing algorithms are only approximation methods. It was not so far given evidence of a Halo orbit and proof of their bifurcation from the planar Lyapunov orbits family. The aim of the project is to provide computer-assisted proof of existence of Halo orbits and to extend research on of period-doubling bifurcations Halo orbits with the development of the mathematical basis of the problems. In order to improve the results of numerical calculations we extend an existing C<sup>1</sup>-Lohner algorithm by interval Hermite-Obreschkoff method.