Stability of planar satellite motions in a circular orbit

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Our contribution is devoted to the satellite attitude dynamics in a central gravity field. We investigate, under the linear approximation, the stability of planar motions – one-parameter family of special solutions of the equations of the satellite attitude – in the case of a circular orbit.

An important feature of the phase space structure of the system is the existence of a heteroclinic loop. It allows us to derive asymptotic formulae characterizing properties of planar motions with a period substantially larger than the orbital period. Using these formulae it is possible to reveal the alternation of stability and unstability regions while the parameter varies.

We present results of extensive numerical investigations of stability also. With the aim of classifying stability properties and to visualize the obtained information in the most clear form, different diagrams are drawn.

This research was supported by INTAS grant 97-10771.