

NONLINEAR DYNAMICS OF A UNIFORM SELF-GRAVITATING ELLIPSOID

G.S. Bisnovatyi-Kogan¹, O.Yu. Tsupko¹

¹ *Space Research Institute Rus. Acad. Sci., Moscow, Russia*

Equations are derived, which describe in a simplified way the newtonian dynamics of a selfgravitating ellipsoidal body. For the equation of state at which a spherical star is unstable, it is obtained, that contraction to a singularity happens only in a pure spherical collapse, and deviations from the spherical symmetry stop the contraction by the stabilising action of nonlinear nonspherical oscillations. A real collapse happens after damping of the oscillations due to energy losses, shock wave formation or viscosity. Detailed analysis of the nonlinear oscillations of a spheroid is performed using a Poincaré map construction. Regions of regular and chaotic oscillations are localized on this map.