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STELLAR DYNAMICS:
FROM CLASSIC TO MODERN

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K. F. Ogorodnikov (1900–1985)

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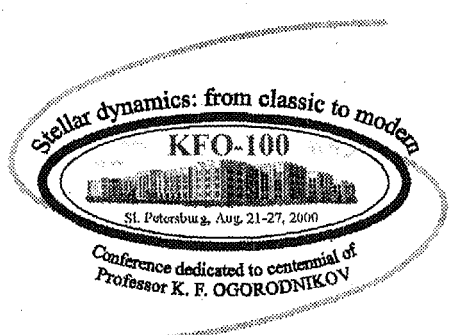

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Some Principal Questions of the Theory of Equilibrium Figures

B. P. Kondratyev

Mathematical Department, Udmurtia State University, Universitetskaya ul. 1, Izhevsk 426034, Russia

The goal of this work is to describe several problems unifying objective of which is to obtain an improved understanding of the theory of equilibrium figures. We will consider three basic questions.

- At first we discuss the stability problem for Jacobi ellipsoids. We start with a demonstration that the bifurcation point for the pear-shaped equilibrium figures on the Jacobi sequence must coincides with the corresponding neutral point. Our method is original and independent on Cartan's one.

- Then we prove an impossibility of the quasiprecesson for the large class of equilibrium figures with (or without) internal flows. This analysis significantly extends known results, obtained early by H. Poincaré, P. Appell and V. A. Antonov.

- At last, the new formula for the angular velocity $\Omega/\sqrt{\pi G\rho}$ of rotating, self-gravitating homogeneous equilibrium figures has been derived:

$$\Omega^2 = 1 + \eta - \sqrt{(1+\eta)^2 - \frac{6W_i - W_t}{\pi G\rho I_3}}.$$

  Here W_t is the total gravitational potential energy, W_i is the "internal" potential energy of the figure, and $\eta = W_t/(2\pi G\rho I_3)$ is the normalized total gravitational potential energy.

The full text of the paper is published (in English) in Kinematika i Fizika Nebesnykh Tel, Prilozhenie [Kinematics and Physics of Celestial Bodies, Supplement], 1999, no.2, 16–21.