ISOTHERMAL TRAJECTORIES FOR THE HABITABLE PLANETS. N. I. Perov, Cultural and Educational Centre named after Valentina Tereshkova, ul. Chaikovskogo, 3, Yaroslavl, 150000, Russian Federation. E-mail: perov@yarplaneta.ru.

Introduction: There are known dozen factors determined possible origin and evolution of exoplanetary life. For the life of the Earth's type these factors are - the temperature of the star, semimajor axes and eccentricity of the planetary orbit, period of planet's rotation, the angle between plane of equator and planetary orbit plane, water on the surface and the vapor in the atmosphere, vulcans, mass of the planet, satellite of the planet, dependence "energy–mass–food–size of the animals" [1]. Below we consider the quasiisothermal orbits of the habitable planets m_3 in the binary system consisted of two stars with mass m_1 and m_2 in the frame of the restricted planar circle 3 body problem.

Fundamental Equation: We use the well-known differential celestial mechanical equation [2] and dependence between temperature T of the planet and planetary distances r_{13} and r_{23} from the stars. (For the system "a star and a planet" we have $T \sim r^{-1/2}$ [3]).

Examples: For the numerical experiments we put $m_1/m_2 = 50$, m_3 is mass of a planet. In the process of the corresponding equations solving we use the following units: m_1 is the unit of mass, r_{12} is the unit of length, the unit of time t is corresponded for the case $G=1$, where G is the gravitating constant. Moreover, we put for all considered cases the following *initial* conditions: $x_1 \neq 0$, $dx_1/dt=0$, $y_1=0$, $dy_1/dt=0$, $x_2 \neq 0$, $dx_2/dt=0$, $y_2=0$, $dy_2/dt=0$, $x_3 \neq 0$, $dx_3/dt=0$, $y_3=0$, $dy_3/dt \neq 0$. The results of the numerical experiments in intervals of time t motion corresponded to hundreds and thousands revolutions of major bodies are presented in Fig.1 – 3.

Conclusions: There are existed (theoretically) quasiisothermal trajectories ($40°C < T < +40°C$) for the habitable planets (in the binary systems of stars) in the form of the narrow rings – a) near the star – satellite; b) near the main star; c) near both stars ($r_3>1$). (Fig.1. and Fig.2.). Moreover, we found "strange" quasiisothermal trajectories of habitable planets (Fig.3.). In the work [3] the life' belts are considered for two body problem like "a star and a planet".

References: [1] Gyndilis L. M. (2004) *SETI: Searching for Extraterrestrial Intelligence*. Moscow. Ed. of Physical and Mathematical Literatures. 648 pp. (In Russian). [2] Szebehely V. (1967) *Theory of Orbits. The Restricted Problem of Three Bodies.* Yale University. New Haven Connecticut. Academic Press New York and London. [3] Kane S. R. and Gelino D. M. The Habitable Zone and Extreme Planetary Orbits / Astrobiology. October 2012, 12(10): P. 940-945.

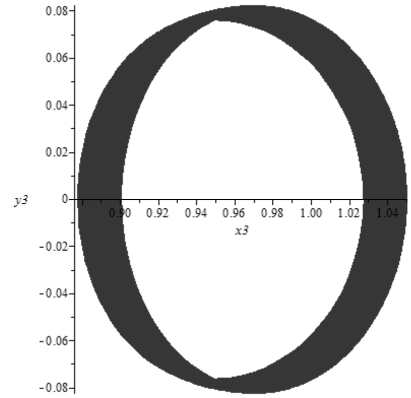

Fig.1. The habitable planet m_3 is moving near the star m_2. $m_2/m_1 = 1/50$. $x_{30} = 1.05$. $(dy_3/dt)_{t=0} = 0.5$. $t=1000$. $N=20000$ (number of points).

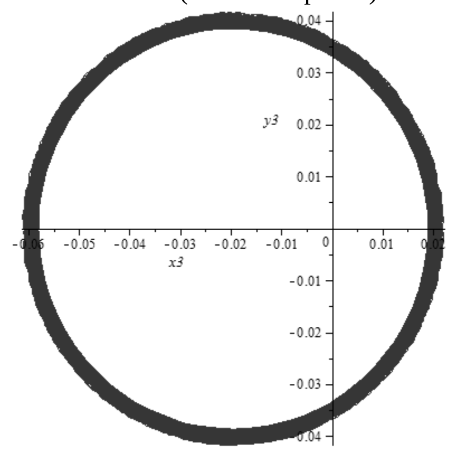

Fig.2. The habitable planet m_3 is moving near the star m_1. $m_2/m_1 = 1/50$. $x_{30} = 0.02$. $(dy_3/dt)_{t=0} = 5.05$. $t=200$. $N=2000$ (number of points).

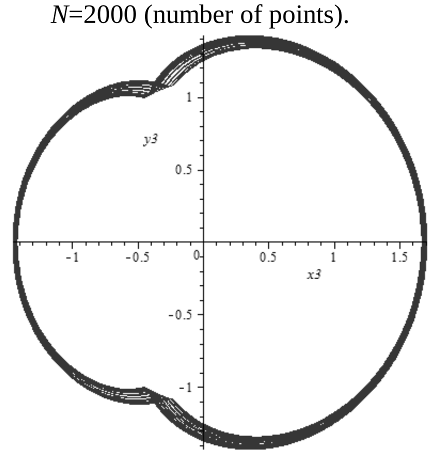

Fig.3. The habitable planet m_3 is moving near the stars $m_1$and m_2. $m_2/m_1 = 1/50$. $x_{30} = -1.45$. $(dy_3/dt)_{t=0} = 0.69112$. $t=2000$. $N=20000$ (number of points).