New fundamental trajectories
at electromagnetic interaction

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The movement trajectories of one particle are given relatively other particle in file TrctElMg, if the force of their interaction is described by expression

$$\vec{F} = \frac{k(1-\beta^2)\cdot\vec{R}}{\{R^2 - [\vec{\beta}\times\vec{R}]^2\}^{3/2}}, \qquad (1)$$

where $\vec{R}$ is radius-vector from one particle to other;
$\vec{\beta} = \vec{v}/c_1$ is non-dimensional velocity;
$\vec{v}$ is velocity vector of one particle relatively other;
c_1 is the speed of light.

In case of electromagnetic interaction of particles with charges q_1 and q_2, the coefficient

$$k = q_1\cdot q_2/\varepsilon, \qquad (2)$$

where ε is dielectric permeability of medium, when the particles are situated.

Interaction of particles, equations of their movement and evaluation of trajectories are given in works [1] - [6] in more details.

These trajectories are represented by two kinds: in polar (Rr, Fi) and Cartesian coordinates (X, Y). The origin of coordinates is at the centre of one of the particles, axis X passes through pericentre of trajectory. Angle Fi is counted from axis X. Besides there are radial velocity Vor, difference of angles dFi between contiguous moments of time and time T of the particle's movement on trajectory, which is counted from the point of pericentre. All values are dimensionless.

The same values are differently designated in file TrctElMg and in printed works [1] - [6]. Therefore basic designations and some their explanations are given below. The dimensionless trajectory is determined by trajectory parameter

$$\alpha_1 = \mu_1 / (R_p v_p^2), \qquad (3)$$

where $\mu_1 = \dfrac{q_1 q_2 (m_1 + m_2)}{\varepsilon m_1 m_2}$ is constant of electromagnetic or $\mu_1 = -G(m_1 + m_2)$ – gravitational interaction;

R_p is radius of the trajectory pericentre;

v_p is velocity in the pericentre.

Interaction of the bodies is determined by interaction parameter

$$\alpha = \frac{2\mu_1}{R_p c_1^2} = -\frac{R_g}{R_p}, \qquad (4)$$

where $R_g = -\dfrac{2\mu_1}{c_1^2}$. The following designations are used:

Al1 = α_1, Bt = β_p; Btc = $\beta_{pc} = (1 - \alpha_1^2)^{0.5}$;
Al10 = α_1^0; Bto = β_{t0}; Btc0 = $\beta_{pc0} = (1 - (\alpha_1^0)^2)^{0.5}$; Br0 = β_{r0};
Al = $\alpha = 2\alpha_1\beta_p^2$; ficl = φ_{cl}; Tcl = $\bar{t}_{cl}$; Racl = $\bar{R}_{acl}$.

Here values with index “0” are referred to the point of trajectory with radius R_0.

The parameters of the classical trajectory are designated by index «cl»:

for hyperbolic and parabolic orbits (α_I >= -0.5) the values φ_{cl} and $\bar{t}_{cl}$ are angle and relative time for finite values of Rr;

for elliptic orbits (α_I < -0.5) φ_{cl} , $\bar{t}_{cl}$ and $\overline{R}_{acl}$ are angle, time and relative radius in apocentre.

$$\text{Rr} = R/R_p \text{ ; Vor} = \overline{\upsilon}_r = v_r/v_p \text{ ; Vor0} = \overline{\upsilon}_{r0} = \upsilon_r/\upsilon_{t0}\text{; Fi} = \varphi;$$

$$\text{X} = x/R_p; \ \ \text{Y} = y/R_\text{p} \ ; \ \ \text{dFi} = \Delta\varphi \ ; \ \ \text{T} = \bar{t} = t\, \upsilon_p /R_p.$$

Relative time is determined by integral

$$\bar{t} = \int_1^{\overline{R}} \frac{d\overline{R}}{\overline{\upsilon}_r}.$$

For trajectories with Bt = Btc the lower limit of integration is equal to 1.

In file TrctElMg the trajectories distribute into sections and subsections. In the beginning, before trajectory's data, the interaction characteristics and some final information about trajectory are given.

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