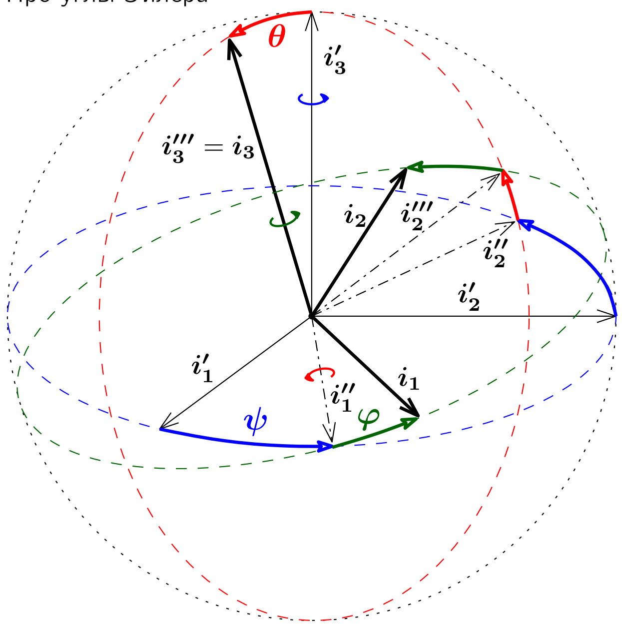
1. $\boldsymbol{r}$: $\boldsymbol{r}(t)$, $(x, y, z)(t)$, $\boldsymbol{r}(s)$.
   $\dot{\boldsymbol{r}}$: $\dot{\boldsymbol{r}}(t)$, $(\dot{x}, \dot{y}, \dot{z})(t)$, $\boldsymbol{\tau}\dot{s}$.
   $\ddot{\boldsymbol{r}}$: $\ddot{\boldsymbol{r}}(t)$, $(\ddot{x}, \ddot{y}, \ddot{z})(t)$, $\ddot{s}\boldsymbol{\tau} + \dot{s}^2 k_1 \boldsymbol{n}$
2. ⟨?⟩
3. В криволинейных координатах

- ▷ $\boldsymbol{v} = \sum_k \dot{q}^k \boldsymbol{e_k}$
- ▷ $\boldsymbol{w} = \sum_k \ddot{q}^k \boldsymbol{e_k} + \sum_{k,i} \dot{q}^k \dot{q}^i \dfrac{\partial \boldsymbol{e_k}}{\partial q^i}$
- ▷ $w^j = \ddot{q}^j + \sum_{k,i} \dot{q}^k \dot{q}^i \, \Gamma^j_{ki}$
- ▷ $\Gamma_{j,\,ki} = \dfrac{\partial \boldsymbol{e_k}}{\partial q^i} \cdot \boldsymbol{e_j}$ — I рода
- ▷ $\Gamma^j_{ki} \;\; = \dfrac{\partial \boldsymbol{e_k}}{\partial q^i} \cdot \boldsymbol{e}^j$ — II рода
- ▷ $w_\ell = \dfrac{\mathrm{d}}{\mathrm{d}t}\left(\dfrac{\partial}{\partial \dot{q}^\ell}\left(\dfrac{\dot{\boldsymbol{r}}^2}{2}\right)\right) - \dfrac{\mathrm{d}}{\mathrm{d}q^\ell}\left(\dfrac{\dot{\boldsymbol{r}}^2}{2}\right)$

4. Про углы Эйлера



- ▷ $\boldsymbol{\omega} = \dot{\psi}\, \boldsymbol{i}'_3 + \dot{\theta}\, \boldsymbol{i}''_1 + \dot{\varphi}\, \boldsymbol{i}_3$

- ▷ $\boldsymbol{R}(t) = \boldsymbol{R}_0(t) + \boldsymbol{r}(t)$
- ▷ $\boldsymbol{v} = \boldsymbol{v}_0 + \boldsymbol{\omega} \times \boldsymbol{r} + \boldsymbol{v_r}$
- ▷ $\boldsymbol{w} = \boldsymbol{w}_0 + \dot{\boldsymbol{\omega}} \times \boldsymbol{r} + \boldsymbol{\omega} \times (\boldsymbol{\omega} \times \boldsymbol{r}) + 2\boldsymbol{\omega} \times \boldsymbol{v_r} + \boldsymbol{w_r}$

5.
6.
7.
8.
9. В поле центральной силы ¬

- ▷ $u = 1/\rho$.
- ▷ Формулы Бине
$$\begin{cases} v^2 = c^2\left(\left(\dfrac{\mathrm{d}u}{\mathrm{d}\varphi}\right)^2 + u^2\right) \\ w_\rho = -c^2u^2\left(\dfrac{\mathrm{d}^2u}{\mathrm{d}\varphi^2} + u\right) \end{cases}$$
- ▷ Невыразимая жжесть

10. ⟨?⟩⟨`:set aflame`⟩Движение твёрдого тела ¬

- ▷ $\omega = 0$ — поступательное
- ▷ $\boldsymbol{v}_0, \boldsymbol{w}_0 = 0, \omega = \dot{\varphi}\boldsymbol{i}_3$ — вращение вокруг неподвижной оси
- ▷ $\boldsymbol{v}_0 \upuparrows \boldsymbol{\omega}$ — винт
- ▷ ⟨?⟩Как попало вокруг неподвижной точки [1] ¬
$$\boldsymbol{\omega} = \boldsymbol{i}_1(\dot{\psi}\sin\theta\sin\varphi + \dot{\theta}\cos\varphi) + \\ + \boldsymbol{i}_2(\dot{\psi}\sin\theta\cos\varphi - \dot{\theta}\sin\varphi) + \\ + \boldsymbol{i}_3(\dot{\psi}\cos\varphi + \dot{\varphi})$$

11. Скорость и ускорение точек твердого тела

- ▷ $\boldsymbol{v} = \boldsymbol{v}_0 + \boldsymbol{\omega} \times \boldsymbol{r}$
- ▷ $\boldsymbol{w} = \boldsymbol{w}_0 + \dot{\boldsymbol{\omega}} \times \boldsymbol{r} + \boldsymbol{\omega} \times (\boldsymbol{\omega} \times \boldsymbol{r})$

12. Сложение движений ТТ

- ▷ $\boldsymbol{v}_{\boldsymbol{r}_n} = \sum_{k=0}^{n-1}\left(\boldsymbol{v_k} + \boldsymbol{\omega_k} \times \overrightarrow{O_kO}\right) + \sum_{k=0}^{n-1} \boldsymbol{\omega_k} \times \boldsymbol{r}_0,\ O_0 = O.$
- ▷ $\boldsymbol{V} = \sum_{k=0}^{n-1}\left(\boldsymbol{v_k} + \boldsymbol{\omega_k} \times \overrightarrow{O_kO}\right)$
- ▷ $\Omega = \sum_{k=0}^{n-1} \boldsymbol{\omega_k} \quad \Rightarrow \boldsymbol{v}_{\boldsymbol{r}_n} = \boldsymbol{V} + \Omega \times \boldsymbol{r}_0$

13. Кинематический винт

- ▷ $\boldsymbol{\omega} \times \boldsymbol{v}_0 + \boldsymbol{\omega} \times (\boldsymbol{\omega} \times \boldsymbol{r}) = 0$

14. Плоское движение

- ▷ $0 = \boldsymbol{v}_0 + \boldsymbol{\omega} \times \boldsymbol{r_c}$
- ▷ $\boldsymbol{r}_* = \left(-\dfrac{v_{0y}}{\omega}, +\dfrac{v_{0x}}{\omega}\right)$ —подвижная центроида
- ▷ $\boldsymbol{r}'_* = \boldsymbol{r}_* + \boldsymbol{r}_0$ — неподвижная центроида
- ▷ $\omega = \dfrac{|\boldsymbol{v}_B - \boldsymbol{v}_A|}{|\boldsymbol{r}_B - \boldsymbol{r}_A|}$
- ▷ $\omega = \dfrac{|\boldsymbol{v}_a \times \boldsymbol{r}_{A*}|}{r^2_{A*}}$ и то же с B.
- ▷ центр ускорений: ⟨?⟩

15. Динамика вращения ТТ [2]

- ▷ $M = \displaystyle\int_\tau 1\,\mathrm{d}\mu(r)$, $\boldsymbol{r_c} = \dfrac{\int_\tau \boldsymbol{r}\,\mathrm{d}\mu(r)}{\int_\tau 1\,\mathrm{d}\mu(r)}$
- ▷ $\boldsymbol{\ell} = \displaystyle\int_\tau (\boldsymbol{r} \times (\boldsymbol{\omega} \times \boldsymbol{r})\,\mathrm{d}\mu,\ \boldsymbol{\ell}' = \int_\tau (\boldsymbol{R} \times \boldsymbol{v})\,\mathrm{d}\mu$
- ▷ $\boldsymbol{\ell}' = \boldsymbol{R}_0 \times \boldsymbol{v}_0\, M + \boldsymbol{r_c} \times \boldsymbol{v}_0\, M + \boldsymbol{R}_0 \times (\boldsymbol{\omega} \times \boldsymbol{r_c})M + \boldsymbol{\ell}$
- ▷ $T = \dfrac{1}{2}\displaystyle\int_\tau (\boldsymbol{\omega} \times \boldsymbol{r})^2\,\mathrm{d}\mu,\ T' = \dfrac{1}{2}\int_\tau \boldsymbol{v}^2\,\mathrm{d}\mu$
- ▷ $T' = T + \dfrac{1}{2}M\boldsymbol{v}_0^2 + M\boldsymbol{v}_0 \cdot (\boldsymbol{\omega} \times \boldsymbol{r_c})$
- ▷ $\ell_\omega = \omega J_\omega$
- ▷ $\boldsymbol{\ell} = \widehat{J}\boldsymbol{\omega} = \sum_{j,k} J_{jk}\omega_k\,\boldsymbol{i}_j,\ J_{ik} = \displaystyle\int_\tau (r^2\delta_{jk} - x_jx_k)\,\mathrm{d}\mu$
- ▷ $T = \dfrac{J_\omega\omega^2}{2} = \dfrac{\widehat{J}\boldsymbol{\omega} \cdot \boldsymbol{\omega}}{2}$

[1] У нас тут вроде косяк, а дальше снова как здесь ⟨⍨⟩
[2] Здесь по-хорошему надо меру на многобразии вводить