[1] №791 $a=9{,}5\cdot10^{-8}$; $r_0=2{,}8\cdot10^{-15}$; $a_0=5{,}3\cdot10^{-11}$

300 б Алексеєва

$$\frac{dU}{dt}=-\langle P_{E1}\rangle=-\frac{2e^2a^2}{3c^3}$$

$$\frac{e^2}{r^2}=m_0a_r\approx m_0\frac{v_0^2}{r}$$

$$\frac{dU}{dt}=-\frac{2e^6}{3r^4m_0^2c^3}=\frac{2}{3}\frac{r_0^3}{r^4}m_0c^3 \Rightarrow r_0=\frac{e^2}{m_0c^2}=2{,}8\cdot10^{-15}$$

$$U=-\frac{e^2}{r}+\frac{1}{2}m_0v^2=-\frac{e^2}{2r}=-\frac{r_0}{r}m_0c^2$$

$$\frac{dU}{dt}=\frac{r_0}{2r^2}\dot{r}m_0c^2=-\frac{2}{3}\frac{r_0^3}{r^4}m_0c^3 \quad \text{або} \quad r^2\dot{r}=\frac{1}{3}\frac{dr^3}{dt}=-\frac{4}{3}r_0^2c$$

$$r^3=a_0^3-4r_0^2ct$$

$$t=\frac{a_0^3}{4r_0^2c}=1{,}6\cdot10^{-11}\text{ (секунд)}$$

[2] №739 $F(\omega)=\int_0^\infty E(t)e^{i\omega t}dt=E_0\int_0^\infty e^{-\beta t^2}\cos\omega_0 t\,dt=$

$$=E_0\frac{\omega_0}{(\beta-i\omega)^2+\omega_0^2}$$

$$\varepsilon_\omega=\frac{2e^4\omega^4}{3\pi m^2c^2}\frac{(E\omega)^2}{\omega^4+\gamma\omega^2}=\frac{2e^4\omega^2\omega_0^2}{3\pi m^2c^2(\omega^2+\gamma^2)[(\omega+\omega_0)^2+\beta^2]}\cdot$$

$\cdot[(\omega-\omega_0)^2+\beta^2] \Rightarrow \Delta\omega=\gamma=\omega_0^2r_0=\frac{2e^4\omega^2}{3mc^2}$

---

[3] №360 $\ddot{\vec{d}}=-|e|\ddot{\vec{r}}$; $m\ddot{\vec{r}}=-|e|\vec{E}$;

$$\vec{d}=\frac{e^2\vec{E}}{m};\quad \vec{d}(\omega)=\frac{1}{\sqrt{2\pi}}\frac{e^2\vec{E}}{m}\int_0^\tau e^{i\omega t}dt=$$

$$=\sqrt{\frac{2}{\pi}}\frac{e^2E}{\omega m}e^{i\omega\tau/2}\sin\frac{\omega\tau}{2}$$

τ – час рух(е) в полі

$$\vec{r}(t)=\vec{v}_0t-\frac{|e|\vec{E}}{2m}t^2$$

$$v_0\cos\alpha\,t-\frac{|e|E}{2m}t^2=0$$

$$t:\ t=0$$

$$t=\frac{2v_0m\cos\alpha}{|e|E}$$

$$d\varepsilon_\omega=\frac{8e^4E^2}{3\pi m^2c^3\omega^2}\sin^2\frac{\omega m v_0\cos\alpha}{|e|E}d\omega$$