

宇田雄一「古典物理学」

【1c1】 $\exists t_0, A \in \mathbb{R}$; 【1c1a】 and 【1c1b】

【1c1a】 $\alpha < 0$ and $a(3) < bE/H$ and $t_0 = \pi \beta / (-\alpha \sqrt{-\alpha})$
and $A = \pi / \sqrt{-\alpha}$

【1c1b】 $\forall t \in \mathbb{R} \setminus \{4\}; \forall n \in \mathbb{Z}; [-t_0 \leq t(4) - 2nt_0 \leq 0 \Rightarrow$ 【1c1b1】]
and $[0 \leq t(4) - 2nt_0 \leq t_0 \Rightarrow$ 【1c1b2】]

【1c1b1】 $\exists z \in \mathbb{R}; z = E f(t, 1, 1) + b$ and

$$t(4) = 2nt_0 - \frac{1}{\alpha} \sqrt{\alpha z^2 + 2\beta z + c} + \frac{\beta}{\alpha \sqrt{-\alpha}} \cos^{-1} \left(\frac{\alpha z + \beta}{\sqrt{\beta^2 - \alpha c}} \right) \text{ and}$$

$$f(t, 2, 1) = a(2) \left[2nA - \frac{1}{\sqrt{-\alpha}} \cos^{-1} \left(\frac{\alpha z + \beta}{\sqrt{\beta^2 - \alpha c}} \right) \right] \text{ and}$$

$$f(t, 3, 1) = \frac{E}{H} t(4) + \frac{1}{EH} \sqrt{\alpha z^2 + 2\beta z + c}$$

【1c1b2】 $\exists z \in \mathbb{R}; z = E f(t, 1, 1) + b$ and

$$t(4) = 2nt_0 + \frac{1}{\alpha} \sqrt{\alpha z^2 + 2\beta z + c} - \frac{\beta}{\alpha \sqrt{-\alpha}} \cos^{-1} \left(\frac{\alpha z + \beta}{\sqrt{\beta^2 - \alpha c}} \right) \text{ and}$$

$$f(t, 2, 1) = a(2) \left[2nA + \frac{1}{\sqrt{-\alpha}} \cos^{-1} \left(\frac{\alpha z + \beta}{\sqrt{\beta^2 - \alpha c}} \right) \right] \text{ and}$$

$$f(t, 3, 1) = \frac{E}{H} t(4) - \frac{1}{EH} \sqrt{\alpha z^2 + 2\beta z + c}$$

【1c2】 $\exists t_0, A \in \mathbb{R}$; 【1c2a】 and 【1c2b】

【1c2a】 $\alpha < 0$ and $a(3) > bE/H$ and $t_0 = \pi \beta / (-\alpha \sqrt{-\alpha})$
and $A = \pi / \sqrt{-\alpha}$

【1c2b】 $\forall t \in \mathbb{R} \setminus \{4\}; \forall n \in \mathbb{Z}; [-t_0 \leq t(4) - 2nt_0 \leq 0 \Rightarrow$ 【1c2b1】]
and $[0 \leq t(4) - 2nt_0 \leq t_0 \Rightarrow$ 【1c2b2】]

【1c2b1】 $\exists z \in \mathbb{R}; z = E f(t, 1, 1) + b$ and

$$t(4) = 2nt_0 + \frac{1}{\alpha} \sqrt{\alpha z^2 + 2\beta z + c} + \frac{\beta}{\alpha \sqrt{-\alpha}} \cos^{-1} \left(\frac{-\alpha z - \beta}{\sqrt{\beta^2 - \alpha c}} \right) \text{ and}$$

$$f(t, 2, 1) = a(2) \left[2nA - \frac{1}{\sqrt{-\alpha}} \cos^{-1} \left(\frac{-\alpha z - \beta}{\sqrt{\beta^2 - \alpha c}} \right) \right] \text{ and}$$