$\boxed{3}$

(1) スピンは $\chi_+(1)\chi_-(2) = \begin{pmatrix}1\\0\end{pmatrix}\otimes\begin{pmatrix}0\\1\end{pmatrix}$ などで表すと.

$\chi_+^*(1)\chi_-^*(2)\,\chi_+(1)\chi_-(2) = 1,$ ← (異なると0になる.)

$$H(1,2) = \begin{bmatrix} E_s+E_p+J & & K & \\ & E_s+E_p+J & & K \\ K & & E_s+E_p+J & \\ & K & & E_s+E_p+J \end{bmatrix}$$

⇓

$E = E_s+E_p+J\pm K$

① $E = E_s+E_p+J+K$ の時.

$\phi_1 = \psi_1+\psi_3$
$\phi_2 = \psi_2+\psi_4.$

(($\psi_1-\psi_4,\ \psi_2-\psi_3$) → この中に右ス分交対称)

② $E = E_s+E_p+J-K$ の時.

$\phi_3 = \psi_1-\psi_3$
$\phi_4 = \psi_2-\psi_4.$

⇓

反対称にしたい.

($\Psi_1 = \phi_1-\phi_2$), ϕ_2, ϕ_4 は⑤ ∴ ($\Psi_2 = \phi_3+\phi_4$)

↪ 軌道か、スピンを反対称にする.

→ 計算して, $\Psi_1 : 0$, $\Psi_2 = 2\hbar^2$ ← $s(1+s)\hbar^2$

($|\uparrow\downarrow\rangle+|\downarrow\uparrow\rangle$ と $|\uparrow\downarrow\rangle-|\downarrow\uparrow\rangle$ の2つの状態)

↓

$S_z=0$ になる.

$s=1,\ m=-1, \boxed{0}, 1$
$s=0,\ m=\boxed{0}$

$\boxed{1}$

$m\ddot{d}(t) = -k\,y(t)$

(1)

$$d(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} \tilde{d}(w)\, e^{iwt}\, dt.$$

$$y(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} \tilde{y}(w)\, e^{iwt}\, dt$$

$\therefore\ -mw^2\,\tilde{d}(w) = -k\,\tilde{y}(w) = d\tilde{w} - \tilde{d}$

$\therefore\ \tilde{H}(w) = \dfrac{k}{mw^2}$ //

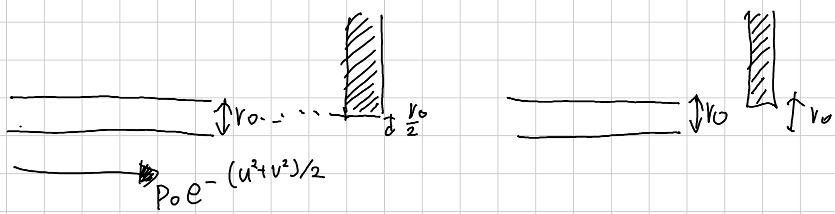
(2) $V_{out} = \frac{1}{C}\int_0^t I(t')\, e^{-iwt}\, dt \rightarrow \hat{V}_{out} = \frac{1}{C} I(t)$

$I(t) = \int \tilde{I}(w)$

$\therefore\ -iw\,\tilde{V}_{out} = \frac{1}{C}\tilde{I}$ $\therefore\ G(w) = i\dfrac{1}{wC}$ //

$\log|G(w)| = -\log|wC|$

(3)



$-R_2 I_2 = V_{out} = -\frac{Q}{C} = -\frac{1}{C}\int I_1(t)\,dt$, $(I_{in} = I_1 + I_2)$

$\therefore\ V_{out} = -\frac{1}{C}\int dt$