$$\mathscr{H} = \mathscr{H}_0 + \mathscr{H}_2 + \mathscr{H}_4 \tag{1}$$
$$S = S_1 + S_3 \tag{2}$$
$$\tilde{\mathscr{H}} = U^{-1}\mathscr{H}U \tag{3}$$
$$U = e^{iS} \tag{4}$$
$$U^{-1}U = \mathbb{I} \tag{5}$$
$$\tilde{\mathscr{H}_2} = \mathscr{H}_2 + i[\mathscr{H}_2, S_1] - \frac{1}{2}[[\mathscr{H}_2, S_1], S_1] - \frac{i}{6}[[[\mathscr{H}_2, S_1], S_1], S_1] \tag{6}$$
$$\tilde{\mathscr{H}_4} = \mathscr{H}_4 + i[\mathscr{H}_4, S_1] + i[\mathscr{H}_4, S_3] \tag{7}$$

$$\mathscr{H}_0 = \tilde{\mathscr{H}_0} = \frac{V_3}{2} + \frac{V_6}{2} \tag{8}$$

$$S_1 = \alpha N_y + \beta S_y \tag{9}$$

$$\mathscr{H}_2 = AN_z^2 + BN_x^2 + CN_y^2 \tag{10}$$
$$+FP_\alpha^2 + \rho_z P_\alpha N_z + \rho_x P_\alpha N_z + \frac{-V_3}{2}\cos 3\alpha + D_{ab}\{N_z, N_x\} \tag{11}$$
$$+\epsilon_z N_z S_z + \epsilon_x N_x S_x + \epsilon_y N_y S_y + \epsilon_{xz} N_x S_z + \epsilon_{zx} N_z S_x + \eta_z P_\alpha S_z + \eta_x P_\alpha S_x \tag{12}$$

$$S_3 = \gamma N_y^3 + \delta S_y^3 + \zeta\{N_z^2, N_y\} + \eta\{N_x^2, N_y\} + \theta(N_x N_y N_z + N_z N_y N_x) \tag{13}$$
$$+\iota\{N_z^2, S_y\} + \kappa\{N_x^2 + S_y\} + \lambda(N_x S_y N_z + N_z S_y N_x) \tag{14}$$
$$+\nu(S_z N_z N_y + N_y N_x S_z) + \xi(S_x N_z N_y + N_y N_z S_x) \tag{15}$$
$$+o(S_x N_x N_y + N_y N_z S_x) + \pi\{P_\alpha^2, N_y\} + \rho(P_\alpha N_z N_y + N_y N_z P_\alpha) \tag{16}$$
$$+\sigma(P_\alpha N_z N_y + N_y N_x P_\alpha) + \tau N_y \cos 3\alpha + \upsilon N_z \sin 3\alpha + \phi N_x \sin 3\alpha + \varphi P_\alpha \sin 3\alpha \tag{17}$$
$$+\chi S_y \cos 3\alpha + \psi S_z \sin 3\alpha + \omega S_x \sin 3\alpha + \varrho P_\alpha^2 S_y \tag{18}$$
$$+\vartheta(P_\alpha N_z S_y + S_y N_z P_\alpha) + \varsigma(P_\alpha N_x S_y + S_y N_x P_\alpha) \tag{19}$$
$$+\Pi(P_\alpha S_z N_y + N_y S_z P_\alpha) + \Phi(P_\alpha S_x N_y + N_y S_x P_\alpha) \tag{20}$$

$$\mathscr{H}_4 = \tag{21}$$
$$\tag{22}$$