3-5 同步电机定子三相通入直流，$i_A = 1, i_B = -1, i_C = 3$，转子转速为 ω_N，$\alpha = \alpha_0 + \omega_N t$，求转换到 dq0 坐标系的 i_d, i_q 和 i_0。

$$i_d = \frac{2}{3} \left[i_A \cos\alpha + i_B \cos(\alpha - 120°) + i_C \cos(\alpha + 120°) \right]$$

$$= \frac{2}{3} \left[\cos\alpha - \cos(\alpha - 120°) + 3\cos(\alpha + 120°) \right]$$

$$= -\frac{4}{3}\sqrt{3}\sin\alpha = -\frac{4}{3}\sqrt{3}\sin(\alpha_0 + \omega_N t)$$

$$i_q = \frac{2}{3} \left[i_A \sin\alpha + i_B \sin(\alpha - 120°) + i_C \sin(\alpha + 120°) \right]$$

$$= \frac{2}{3} \left[\sin\alpha - \sin(\alpha - 120°) + 3\sin(\alpha + 120°) \right]$$

$$= 2\sqrt{3}\cos\alpha = 2\sqrt{3}\cos(\alpha_0 + \omega_N t)$$

$$i_0 = \frac{1}{3}(i_A + i_B + i_C) = 1$$

3-6 同步电机定子通以负序电流，$i_A = \cos\omega_N t$，$i_B = \cos(\omega_N t + 120°)$，$i_C = \cos(\omega_N t - 120°)$，求转换到 dq0 坐标系的 i_d, i_q 和 i_0。

设：$\alpha = \alpha_0 + \omega_N t$

$$i_d = \frac{2}{3} \left[i_A \cos\alpha + i_B \cos(\alpha - 120°) + i_C \cos(\alpha + 120°) \right]$$

$$= \frac{2}{3} \left[\cos\omega_N t \cos\alpha + \cos(\omega_N t + 120°)\cos(\alpha - 120°) + \cos(\omega_N t - 120°)\cos(\alpha + 120°) \right]$$

$$= \cos(\omega_N t + \alpha) = \cos(\alpha_0 + 2\omega_N t)$$

$$i_q = \frac{2}{3} \left[i_A \sin\alpha + i_B \sin(\alpha - 120°) + i_C \sin(\alpha + 120°) \right]$$

$$= \frac{2}{3} \left[\cos\omega_N t \sin\alpha + \cos(\omega_N t + 120°)\sin(\alpha - 120°) + \cos(\omega_N t - 120°)\sin(\alpha + 120°) \right]$$

$$= \sin(\alpha + \omega_N t) = \sin(\alpha_0 + 2\omega_N t)$$

$$i_0 = \frac{1}{3}(i_A + i_B + i_C) = 0$$