$1:p$ で位相が $\Phi_C \to \Phi_C + \Delta\Phi_C$, $\Phi_D \to \Phi_D + \Delta\Phi_D$ としたものが混ざる.

$$\Phi_H = r t' R r' e^{i\Phi_C}(1 + p e^{i\Delta\Phi_C}) + t' R t t' e^{i\Phi_D}(1 + p e^{i\Delta\Phi_D})]$$
$$\Phi_O = r t' R t e^{i\Phi_C}(1 + p e^{i\Delta\Phi_C}) + t' R t r e^{i\Phi_D}(1 + p e^{i\Delta\Phi_D})]$$

beam intensities

$$I_H = |t'R|^2 [\, |rr'|^2 |1 + p e^{i\Delta\Phi_C}|^2 + |tt'|^2 |1 + p e^{i\Delta\Phi_D}|^2$$
$$+ 2\mathrm{Re}(rr' t^* t'^* e^{i\Delta\Phi}(1 + p e^{i\Delta\Phi_C} + p e^{-i\Delta\Phi_D}))] + O(p^2)$$
$$= |t|^2 |R|^2 [\, |r|^4 (1 + 2p\cos\Delta\Phi_C) + |t|^4 (1 + 2p\cos\Delta\Phi_D)$$
$$- 2|r|^2|t|^2 (\cos\Delta\Phi + p\cos(\Delta\Phi + \Delta\Phi_C) + p\cos(\Delta\Phi - \Delta\Phi_D))]$$

$$I_{Hcd} = |r|^4 |t|^2 |R|^2 (1 + 2p\cos\Delta\Phi_C).$$ (C を通るもののみ残す)

$$I_O \cong |r|^2 |t|^4 |R|^2 [\, |1 + p e^{i\Delta\Phi_C}|^2 + |1 + p e^{i\Delta\Phi_D}|^2 + 2\mathrm{Re}(e^{i\Delta\Phi}(1 + p e^{i\Delta\Phi_C} + p e^{-i\Delta\Phi_D}))]$$
$$= |r|^2 |t|^4 |R|^2 [\, 2 + 2p\cos\Delta\Phi_C + 2p\cos\Delta\Phi_D + 2\cos\Delta\Phi + 2p\cos(\Delta\Phi + \Delta\Phi_C) + 2p\cos(\Delta\Phi - \Delta\Phi_D)]$$

$$I_{Ocd} = |r|^2 |t|^4 |R|^2 (1 + 2p\cos\Delta\Phi)$$

$$\therefore \frac{I_H/I_{Hcd} - I_O/I_{Ocd}}{I_H/I_{Hcd} + I_O/I_{Ocd}}$$

$$= \Bigg[\left(1 + \frac{|t|^4}{|r|^4} \frac{(1 + 2p\cos\Delta\Phi_D)}{(1 + 2p\cos\Delta\Phi_C)} - 2 \frac{|t|^2}{|r|^2} \frac{[\cos\Delta\Phi + p\cos(\Delta\Phi + \Delta\Phi_C) + p\cos(\Delta\Phi - \Delta\Phi_D)]}{(1 + 2p\cos\Delta\Phi_C)} \right)$$
$$- \left(1 + \frac{1 + 2p\cos\Delta\Phi_D}{1 + 2p\cos\Delta\Phi_C} + 2\, \frac{\cos\Delta\Phi + p\cos(\Delta\Phi + \Delta\Phi_C) + p\cos(\Delta\Phi - \Delta\Phi_D)}{1 + 2p\cos\Delta\Phi_C} \right) \Bigg] \Big/ \cdots$$

$$= \frac{\left(\frac{|t|^4}{|r|^4} - 1 \right) \frac{1 + 2p\cos\Delta\Phi_D}{1 + 2p\cos\Delta\Phi_C} - 2 \left(\frac{|t|^2}{|r|^2} - 1 \right) \frac{\cos\Delta\Phi + p\cos(\Delta\Phi + \Delta\Phi_C) + p\cos(\Delta\Phi - \Delta\Phi_D)}{1 + 2p\cos\Delta\Phi_C}}{2 + \quad + \quad +}$$