

Contrast Defect

$$R_{cd} = \frac{P_{SRC}}{P_{BS}} = \frac{\text{Power in SRC at zero DARM offset}}{\text{Power incident on beamsplitter}}$$

Analytic power in output

$$P_{AS} = \underbrace{G_p G_s P_{in} R_a' k^2}_a \Delta L_{DC}^2 + P_{junk} = a \Delta L_{DC}^2 + P_{junk}$$

Numbers from alog 64974

$$P_{in} = 48 \text{ W}$$

$$G_p = 52.8$$

$$G_s = 0.099$$

$$\sqrt{R_a'} = r_a' = 262$$

$$k = 2\pi/\lambda$$

$$\lambda = 1064 \times 10^{-9} \text{ m}$$

$$\Rightarrow a = 0.6 \frac{\text{mW}}{\text{pm}^2}$$

Analytic Optical Gain

$$\frac{P_{AS}}{\Delta L}(\omega) = \underbrace{G_p G_s P_{in} R_a' k^2}_a \Delta L_{DC} = a \Delta L_{DC}$$

Optical power vs Optical gain

$$\Rightarrow P_{AS} = \frac{1}{a} \left[\frac{P_{AS}}{\Delta L}(\omega) \right]^2 + P_{junk}$$