

### ***Deviation Impact on $MSO_g$ (for small $\alpha$ )***

*Let,*

*We have total of  $k$  contours ( $IC_1, IC_k$ )*

*Cost of all contours except  $IC_{k-1}$  is deviated by  $(1 + \alpha)$*

*Cost Incurred due to Bouquet Sequence*

$$BS_{cost} = CC_{k-1} + (1 + \alpha) * (CC_k + \sum_{i=1}^{k-2} CC_i)$$

*Best possible cost*

$$OPT_{cost} = \lim_{h \rightarrow 0} (CC_{k-1} + h) = CC_{k-1}$$

$$\begin{aligned} MSO_g &= \frac{BS_{cost}}{OPT_{cost}} = \frac{(1 + \alpha) * \sum_{i=1}^k CC_i - \alpha * CC_{k-1}}{CC_{k-1}} \\ &= (1 + \alpha) * \frac{r_{pb}^2}{r_{pb}-1} - \alpha \\ &\leq \frac{r_{pb}^2}{r_{pb}-1} * (1 + \alpha) = \frac{r_{pb}^2}{r_{pb}-1} * \eta \end{aligned}$$

*Using  $r_{pb} = 4$ , we will get  $MSO_g$*

$$4 * (1 + \alpha) = 4 * \eta$$

*Cost Deviation ( $\eta$ ) should always respect*

$$1 \leq (1 + \alpha) \ll r_{pb}$$