

lab 81.

Uncertainties

$$\delta p a = 0.01 \text{ mm}$$

$$\overline{a_{kL}} = \frac{14.95 + 14.94 + 14.93 + 14.96 + 14.96}{5} = 14.95 \text{ mm}$$

$$\overline{a_{kR}} = \frac{18.56 + 18.55 + 18.57 + 18.43 + 18.54}{5} = 18.53 \text{ mm}$$

$$u_A(a_{kL}) = \sqrt{\frac{\sum_{i=1}^5 (\overline{a_{kL}} - a_{kLi})^2}{5(5-1)}} \approx 0.024 \text{ mm}$$

$$u_A(a_{kR}) = \sqrt{\frac{\sum_{i=1}^5 (\overline{a_{kR}} - a_{kRi})^2}{5(5-1)}} \approx 0.102 \text{ mm}$$

$$= \frac{10^{-3} \cdot 10^{-3}}{10^{-5}} + \frac{10^{-3} \cdot 10^{-3}}{10^{-5}} =$$

$$= \frac{10^{-6}}{10^{-3}} = 10^{-3}$$

$$u_c(R) = \sqrt{\left(\frac{2r \cdot u(r)}{k \cdot \lambda}\right)^2 + \left(\frac{-r^2 \cdot u(\lambda)}{k \cdot \lambda^2}\right)^2} = 0.00015 \text{ km} = 0.15 \text{ m}$$

$$u(r) = \sqrt{\left(\frac{\partial r}{\partial a_{kL}} \cdot u(a_{kL})\right)^2 + \left(\frac{\partial r}{\partial a_{kR}} \cdot u(a_{kR})\right)^2} =$$

$$= \sqrt{(0.5 \cdot \overset{14.95}{\text{mm}})^2 + (-0.5 \cdot \overset{18.53}{\text{mm}})^2} = 0.0524 \text{ mm}$$

mm

μm

+

mm

$$\mu\text{m} = \mu\text{m} = (10^{-6})^{\frac{1}{2}} = 10^{-3}$$

$$u_c(\bar{R}) = \sqrt{\frac{\sum_{i=1}^4 (\bar{R} - R_i)^2}{4(4-1)}} = 0.0045 \text{ m}$$

$$R = \frac{\bar{r}^2}{k \lambda} = \frac{1.79^2}{5 \cdot 510} = 0.00126 \text{ km}$$

$$\frac{\text{mm}^2}{\text{nm}} = \frac{(10^{-3})^2}{10^{-9}} = \frac{10^{-6}}{10^{-9}} = 10^3 = \text{km}$$