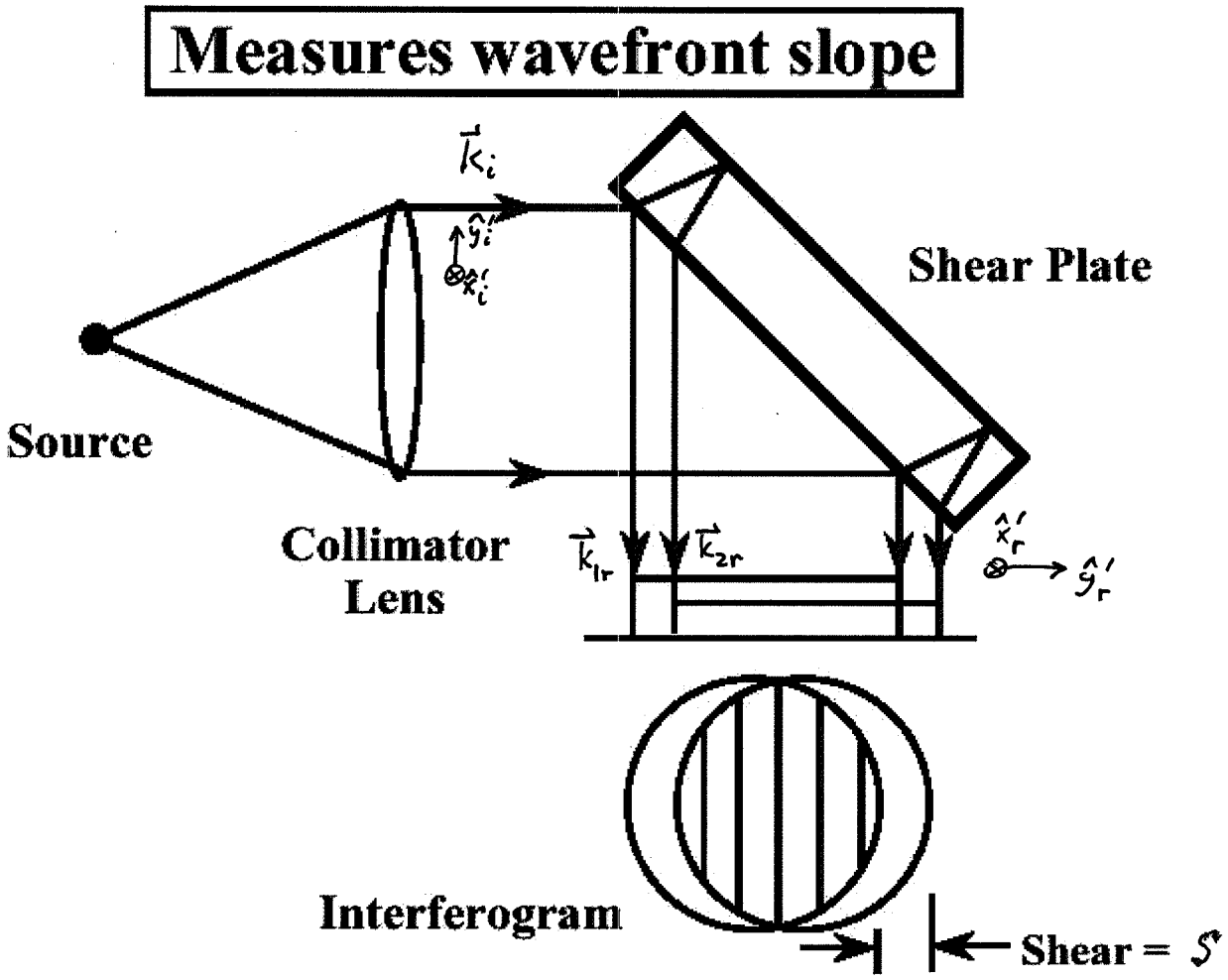
Lateral Shearing Interferometry



(A portion of this slide derived from J. Wyant's notes 2000)

Lateral Shear Fringes

$W(x_r', y_r')$ is wavefront being measured

Bright fringe obtained when

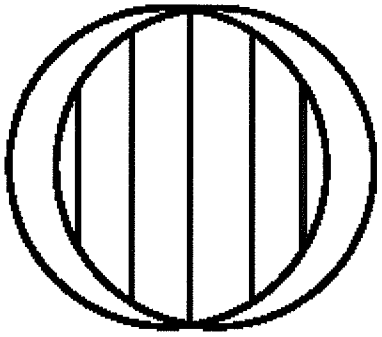
$$W(x_r', y_r' - S) - W(x_r', y_r') = m\lambda$$

$$\left(\frac{\partial \Delta W(x_r', y_r')}{\partial y_r'} \right)_{\substack{\text{Average over} \\ \text{shear distance}}} (S) = m\lambda$$

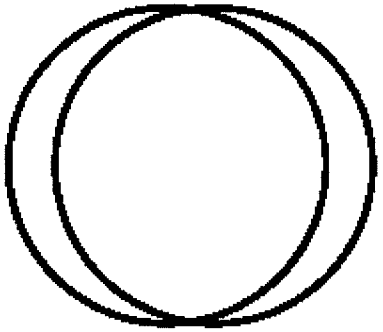
Measures average value of slope over shear distance

(A portion of this slide derived from J. Wyant's notes 2000)

Collimation Measurement

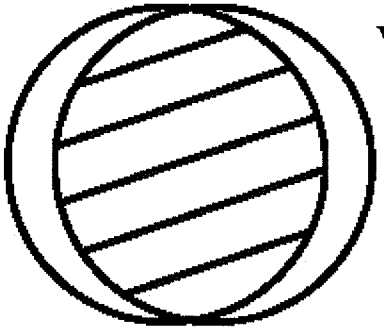


No wedge in shear plate

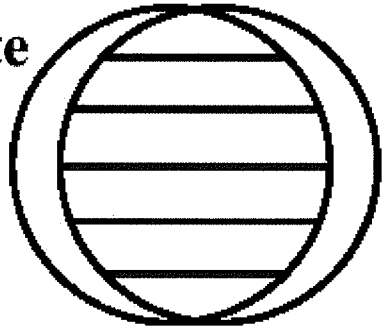


Not collimated

Collimated (one fringe)



Vertical wedge in shear plate



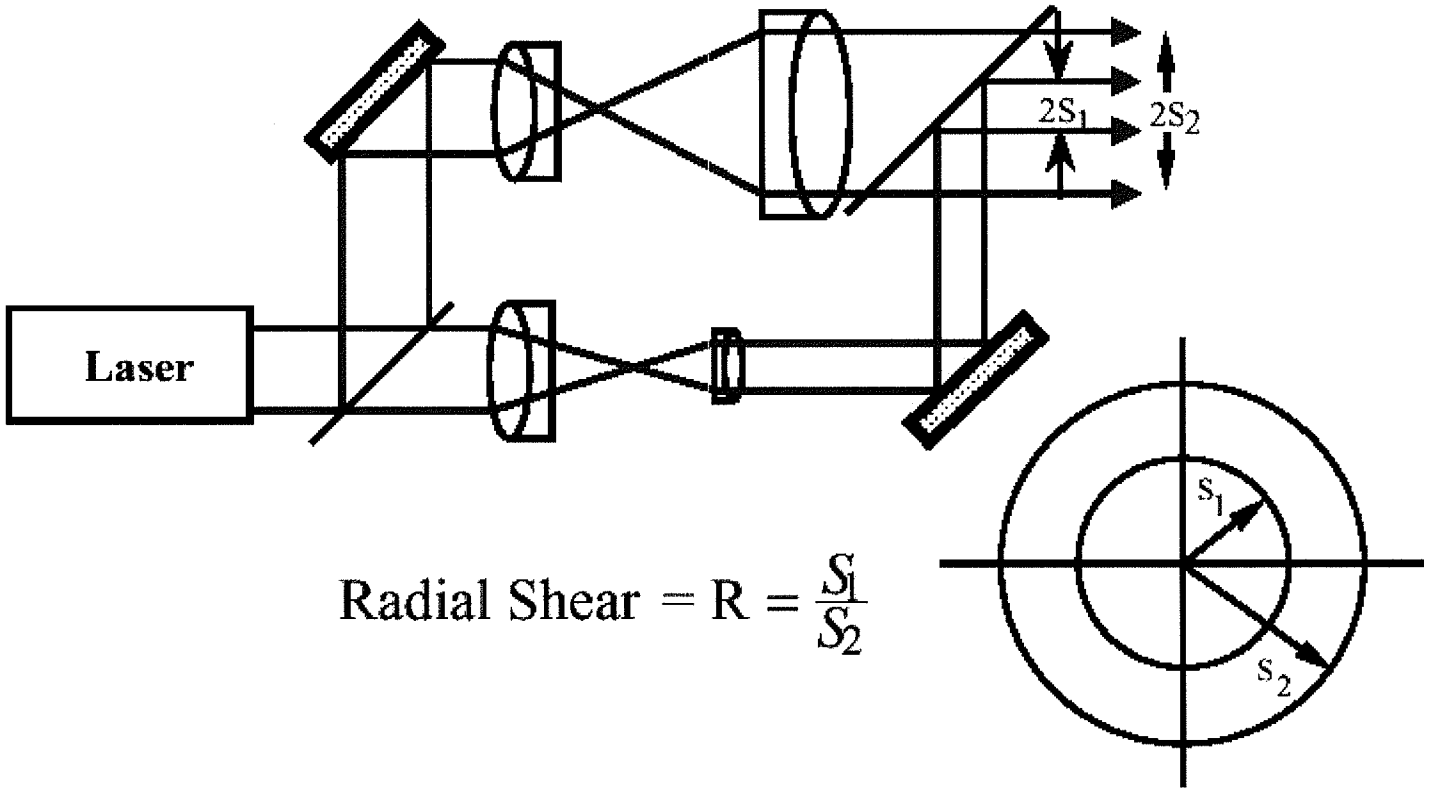
Not collimated

Collimated

(A portion of this slide derived from J. Wyant's notes 2000)

Radial Shear Interferometry

Wavefront is interfered with expanded version of itself



$$\text{Radial Shear} = R = \frac{S_1}{S_2}$$

(A portion of this slide derived from J. Wyant's notes 2000)

Analysis of Radial Shear Interferograms

Wavefront being measured

$$\Delta W(\rho,\theta) = W_{020}\rho^2 + W_{040}\rho^4 + W_{131}\rho^3\cos\theta + W_{222}\rho^2\cos^2\theta$$

Expanded beam can be written:

$$\Delta W(R\rho,\theta) = W_{020}(R\rho)^2 + W_{040}(R\rho)^4 + W_{131}(R\rho)^3\cos\theta + W_{222}(R\rho)^2\cos^2\theta$$

Hence, a bright fringe is obtained whenever

$$\Delta W(\rho,\theta) - \Delta W(R\rho,\theta) = W_{020}\rho^2(1-R^2) + W_{040}\rho^4(1-R^4) + W_{131}\rho^3(1-R^3)\cos\theta + W_{222}\rho^2(1-R^2)\cos^2\theta$$

Same as Twyman-Green if divide each coefficient by $(1 - R^n)$

(A portion of this slide derived from J. Wyant's notes 2000)

Radial Shear Interferogram

- **Variable Sensitivity Test**
- **Large shear - results same as for Twyman-Green**
- **Small shear - Low sensitivity test**

(A portion of this slide derived from J. Wyant's notes 2000)