$$W_{f_\sigma} = \sqrt{\left(\left(\frac{1}{w}W_{slope}\right)^2 + \left(-\frac{slope}{w^2}W_w\right)^2\right)}$$

units

$$= \sqrt{\left(\left(\frac{1}{0.0318} * 10\right)^2 + \left(-\frac{220}{0.0318^2} * 1 * 10^{-4}\right)^2\right)}$$

$$= 315.217 = \pm 3 * 10^2 \ (N/m)$$

Calculation for the zero fringe was done using Paint to measure the pixel location of the center of the circle and the radius. The pixel radius, P_r, was taken as the average of the vertical radius and the horizontal due to elongation of the specimen table 6. Using the fact that the zero fringe is located near 30° from the vertical.

$$Tan(30°) = \frac{x}{P_r}$$

$$x = P_r \tan(30°)$$

$$= 223 * \tan(30°) = 128.749 = 129 \ \pm 5 \ (Pixels)$$

The zero fringe is shown in figure 2 with a green line denoting the angle of 30° and the rest of the fringes are labeled accordingly.

The fringe intercepts around the quarter circle were found using Paint and the angle theta was calculated from the (x, y) pixel location.

$$\tan(\theta) = \frac{x}{y}$$

$$\theta = \tan^{-1}\left(\frac{x}{y}\right) = \tan^{-1}\left(\frac{41}{222}\right) = 10.4637 = 10.46°$$

This is the uncertainty calculation for the angle theta.

$$W_\theta = \sqrt{\left(\left(\frac{y}{x^2+y^2}W_x\right)^2 + \left(-\frac{x}{x^2+y^2}W_y\right)^2\right)}$$

$$= \sqrt{\left(\left(\frac{123}{41^2+123^2} * 5\right)^2 + \left(-\frac{41}{41^2+123^2} * 5\right)^2\right)}$$

$$= 0.038564362 = \pm 4 * 10^{-2} \ (\text{Degrees})$$