To Find the Wavelength of Laser Light by Double Slit Diffraction

Date

Double slit is labelled 0.25 mm

Using a travelling microscope the separation is:

$(9.175 - 9.205) = -0.030\,cm$
$(0.30\,mm)$

Broad crosshairs so difficult to judge exact separation. Estimate Δs to be $\pm 0.05\,mm$

10 fringes cover the range 184 mm to 78 mm

$10w = 106\,mm \pm 2\,mm\ (1.9\%)$
$w = 10.6\,mm \pm 1.9\%$

$s = 0.30\,mm \pm 0.05\,mm\ (17\%)$

$D = 4.00\,m \pm 0.01\,m\ (0.25\%)$

$$\lambda = \frac{ws}{D} = 8.0 \times 10^{-4}\,mm \pm 20\%$$

$$\lambda = \underline{800\,nm \pm 160\,nm}$$

The very least the wavelength could be by this method is 640 nm which is 0.08% off the wavelength given in the laser catalogue.

The biggest uncertainty is in the slit separation.

If the value of 0.25 mm given on the slits is used then $\lambda = 660\ nm \pm 2\%$? ($\pm 10\ nm$)

$s = 0.25\ mm \pm 0.01\ mm\ (4\%)$
$w = 10.6\ mm \pm 2\%$
$\Delta = 4 \times 10^{-3}\ mm \pm 0.25\%$

$\lambda = 660\ nm \pm 6\%\ (\pm 40\ nm)$

This is a much more accurate result.

Perhaps the slit separation has been calculated using this method with known laser wavelength and written on the slits?