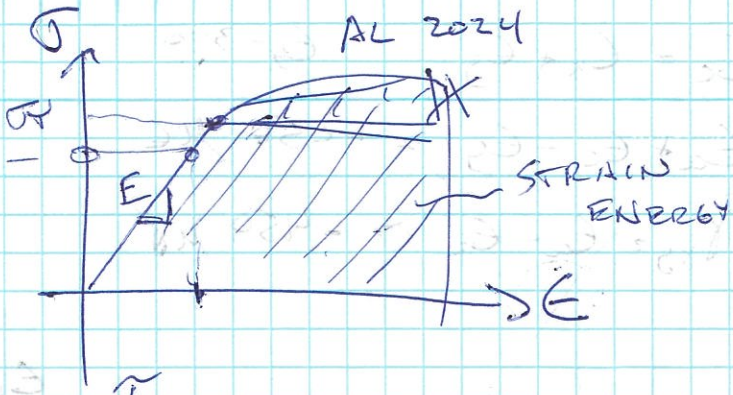
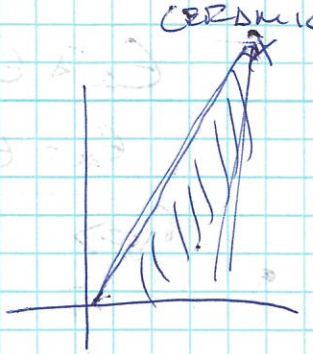
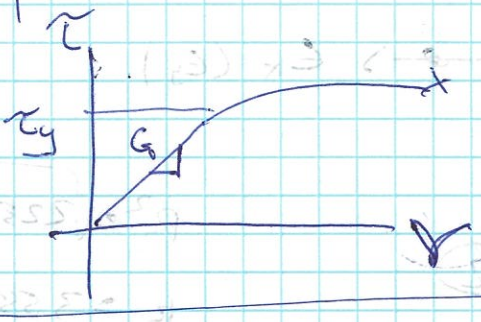
STRESS-STRAIN







3-11 $\phi = 0.5''$ $\quad \epsilon = 0.045 = \epsilon_E + \epsilon_P$

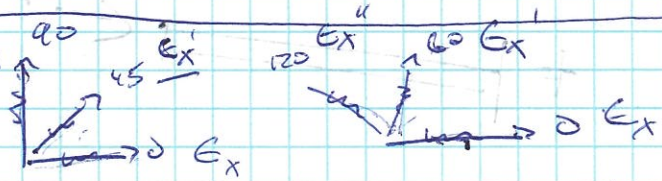
$L = 2''$ $\quad = .005 + .040$

$\sigma = 60$ ksi.

ELASTIC RECOVERY $\Delta L = 2(.005) = .01''$ ELASTIC RECOVERY

PERMANENT DEFORMATION $\Delta L = 2(.040) = .08''$

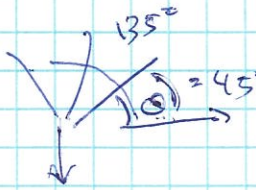
STRAIN ROSETTES



$\epsilon_{x'} = f(\epsilon_x, \epsilon_y, \gamma_{xy}, \theta)$

$\epsilon_{x'} = f(\epsilon_x, \epsilon_y, \gamma_{xy}, \theta_1)$

$\epsilon_{x''} = f(\epsilon_x, \epsilon_y, \gamma_{xy}, \theta_2)$



$\epsilon_a = \frac{\epsilon_x + \epsilon_y}{2} + \frac{\gamma_{xy}}{2}$

$\epsilon_c = \frac{\epsilon_x + \epsilon_y}{2} - \frac{\gamma_{xy}}{2}$

10-24 $\epsilon_y = \epsilon_b = 300\ \mu\epsilon$

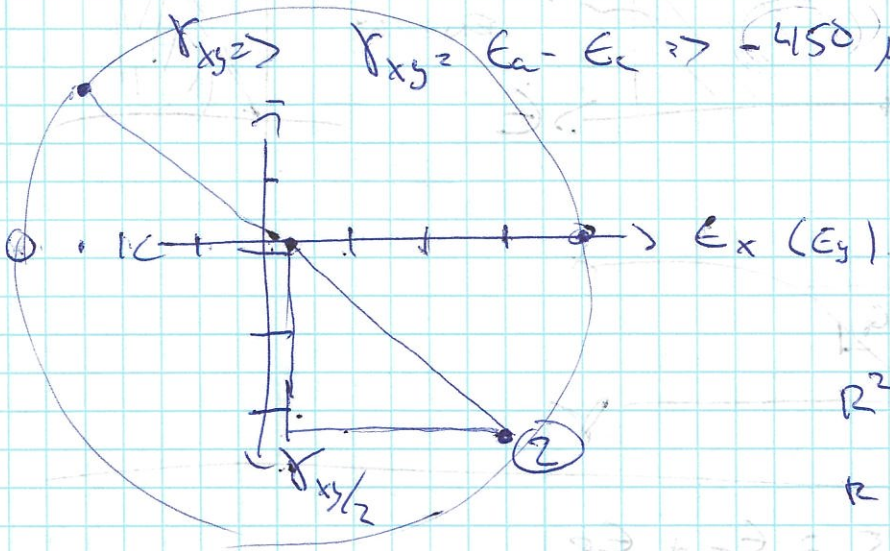
$\epsilon_a = \epsilon_{x'} = \frac{\epsilon_x + \epsilon_y}{2} + \frac{\epsilon_x - \epsilon_y}{2}\cos 2\theta_1 + \frac{\gamma_{xy}}{2}\sin 2\theta_1$

$\epsilon_c = \epsilon_{x''} = \frac{\epsilon_x + \epsilon_y}{2} + \frac{\epsilon_x - \epsilon_y}{2}\cos 2\theta_2 + \frac{\gamma_{xy}}{2}\sin 2\theta_2$

$\epsilon_a + \epsilon_c = \epsilon_x + \epsilon_y$, $\epsilon_y = 300$

$\epsilon_x = \epsilon_a + \epsilon_c - \epsilon_y = -250\ \mu\epsilon$

$\gamma_{xy} = ?$ $\quad \gamma_{xy} = \epsilon_a - \epsilon_c \Rightarrow -450\ \mu\epsilon$



① $(\epsilon_x, \frac{\gamma_{xy}}{2})$

② $(\epsilon_y, -\frac{\gamma_{xy}}{2})$

$\epsilon_1 = 25 + R = \underline{380}$

$\epsilon_2 = 25 - R = \underline{-330}$

$R^2 = \sqrt{225^2 + 275^2}$

$R = 355$

---

1) $\epsilon = \Delta T\ \alpha$

2) ΔL

3) $\Delta L \propto F$

YOUNG'S MODULUS