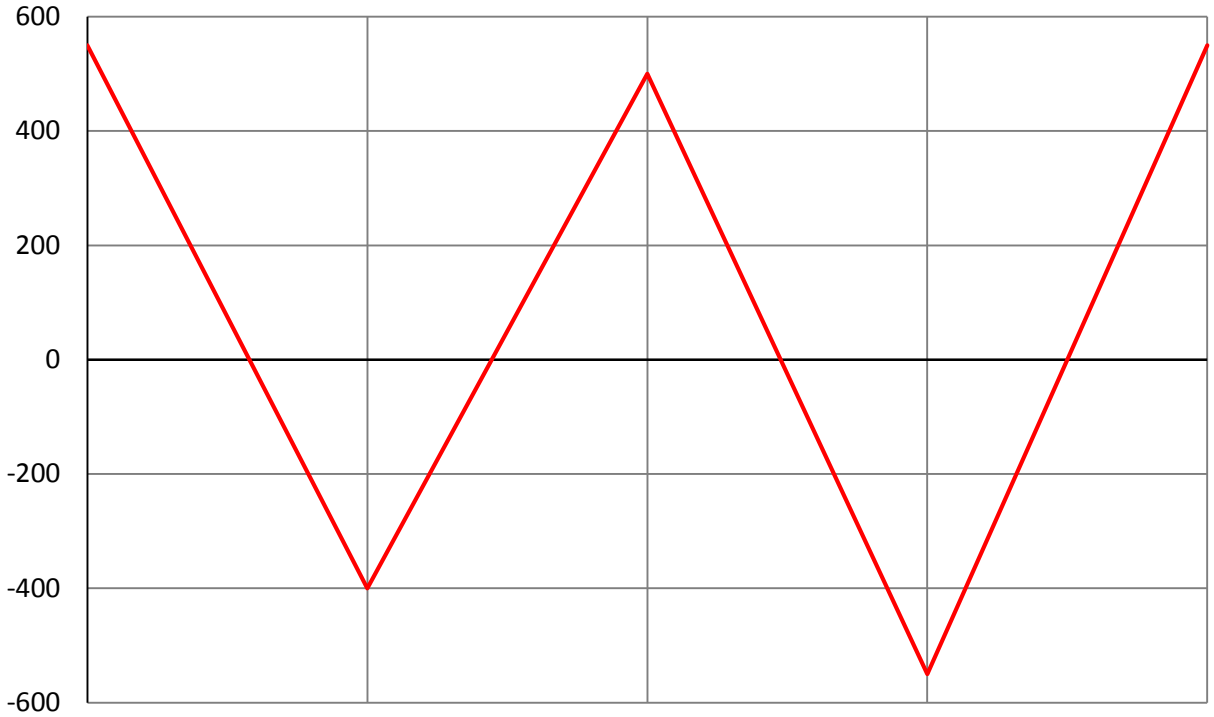
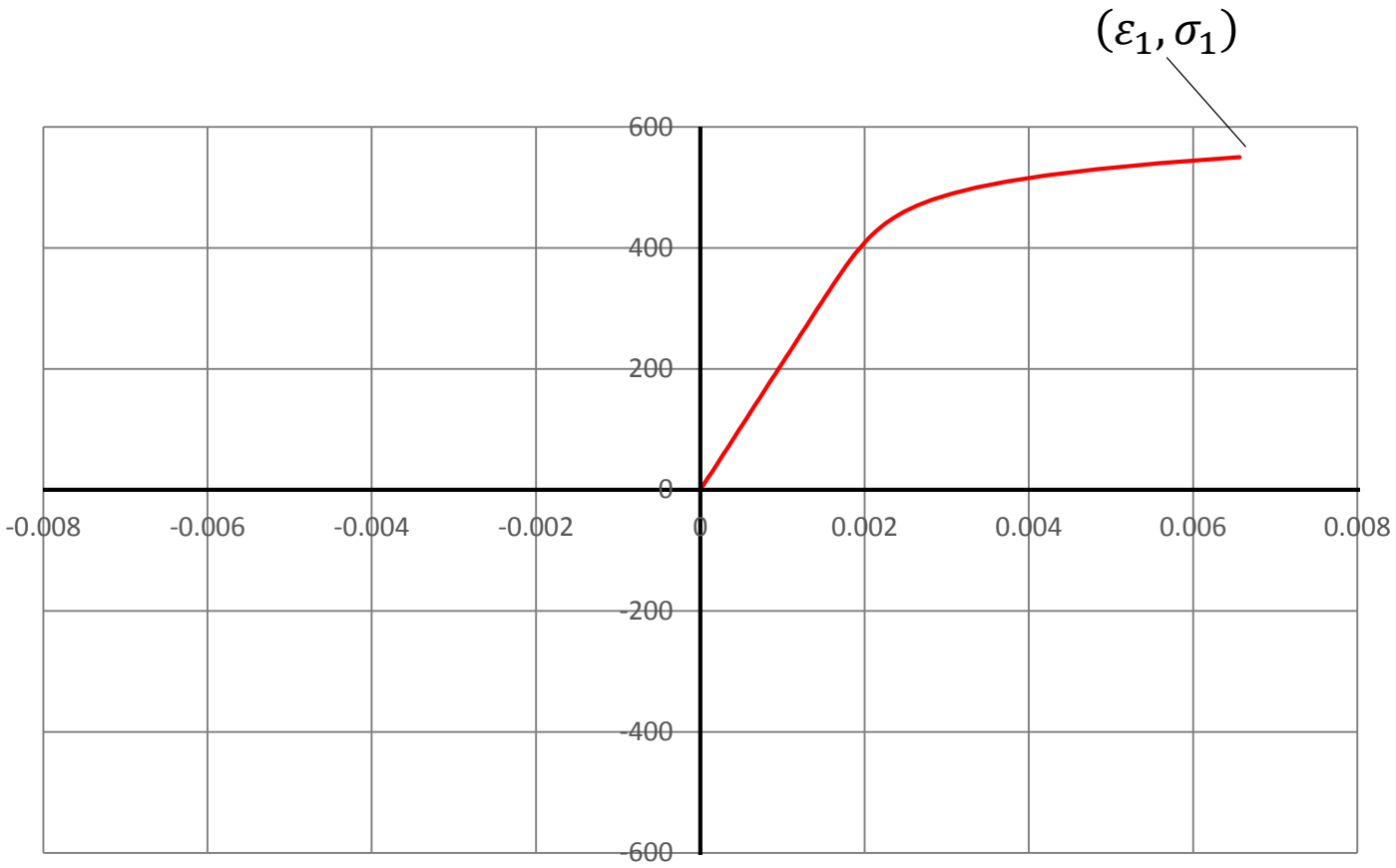


$$E = 210\,000 \text{ MPa}$$
$$K = 804 \text{ MPa}$$
$$n = 0.0686$$

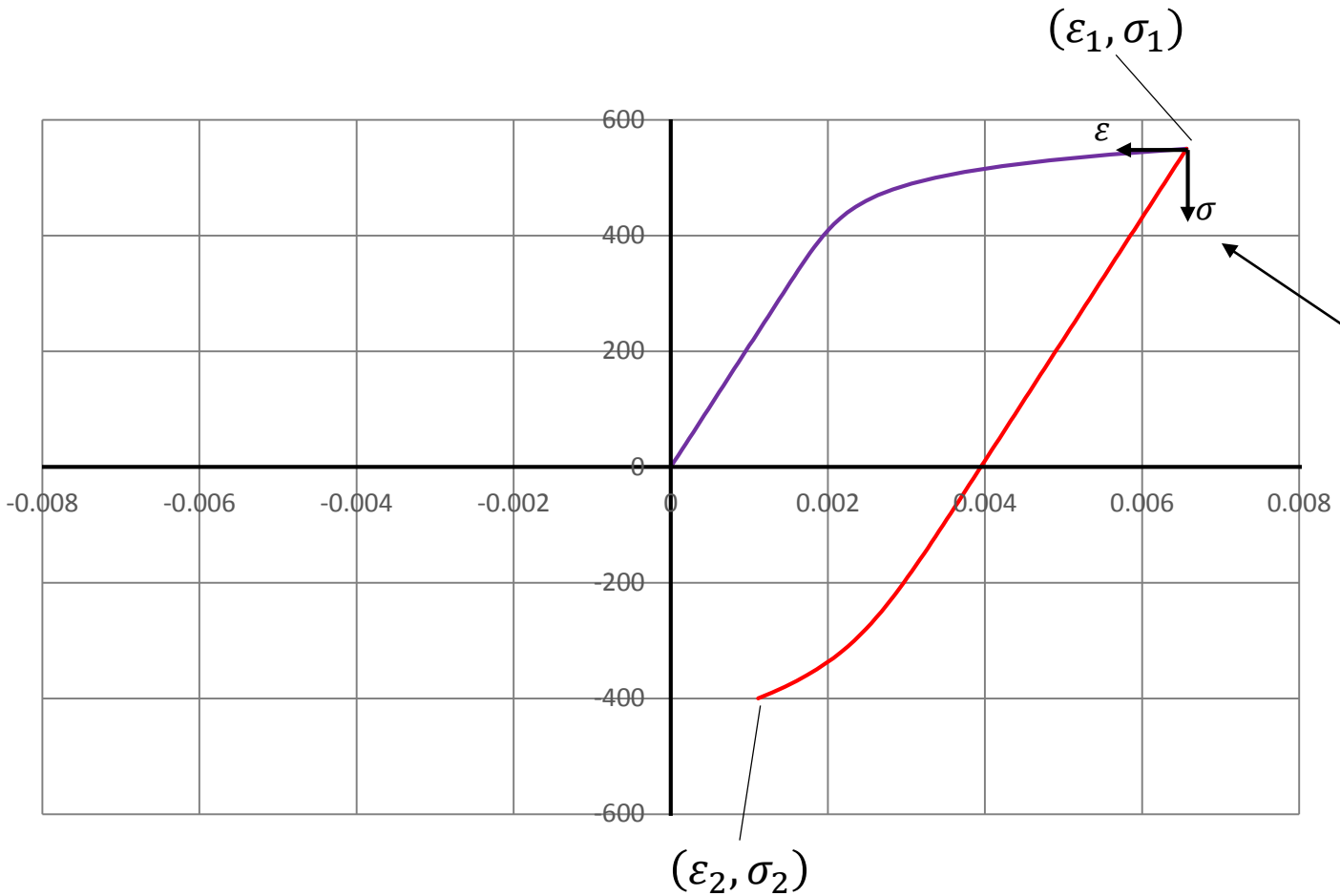
$$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$

Draw hysteresis loop

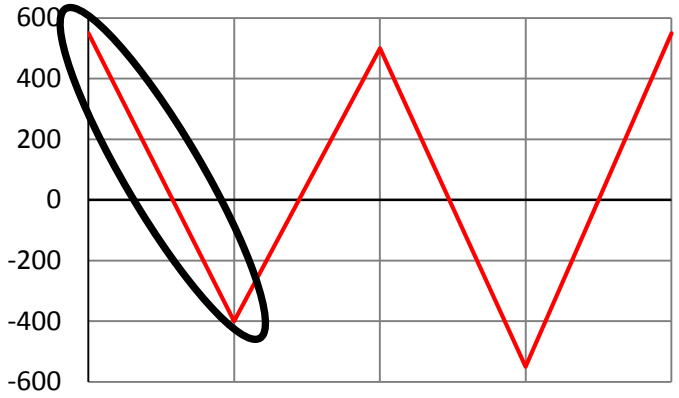


$$\sigma_1 = 550 \text{ MPa}$$

$$\varepsilon_1 = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$



notice directions!

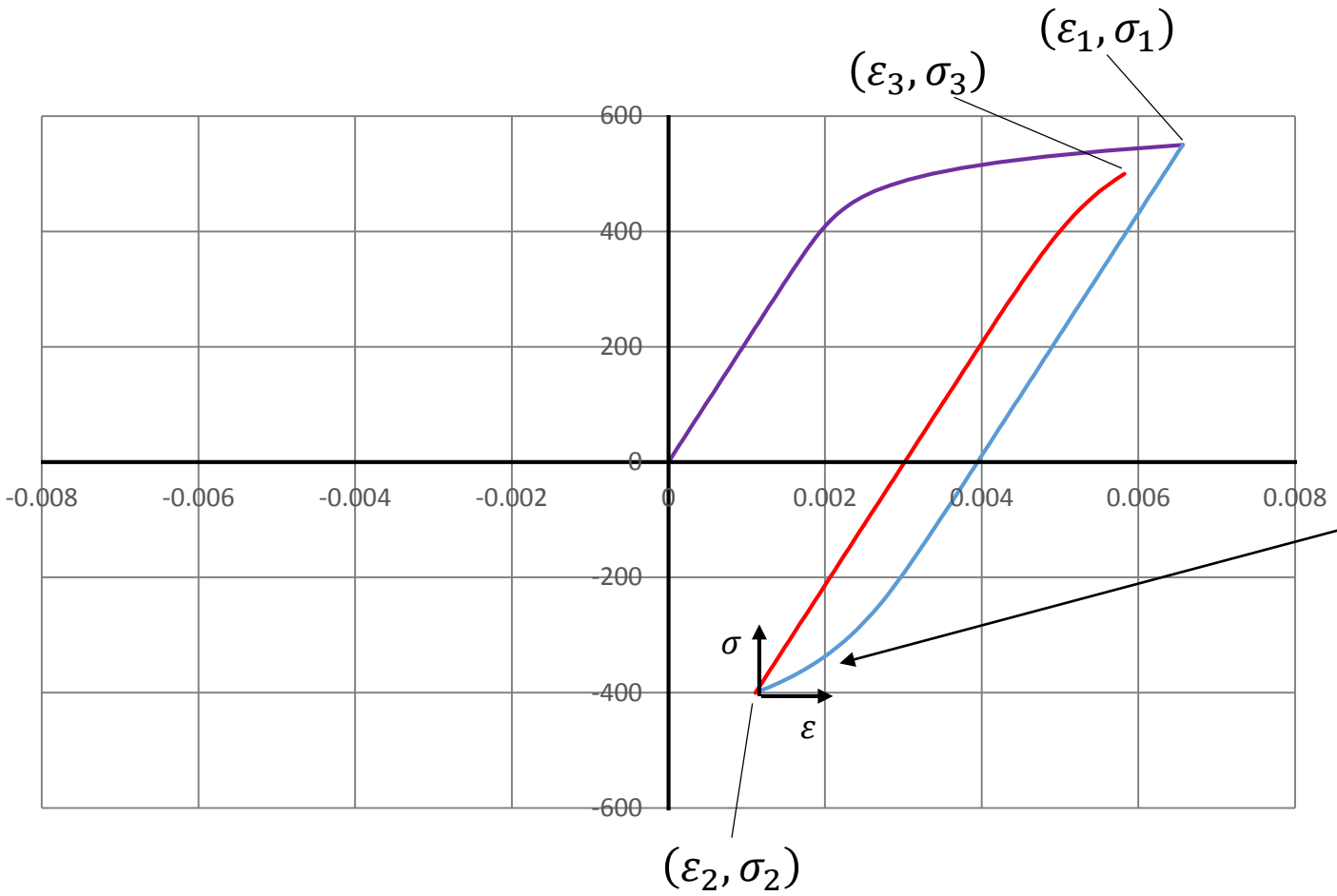


$$\Delta\sigma = 950 \text{ MPa}$$

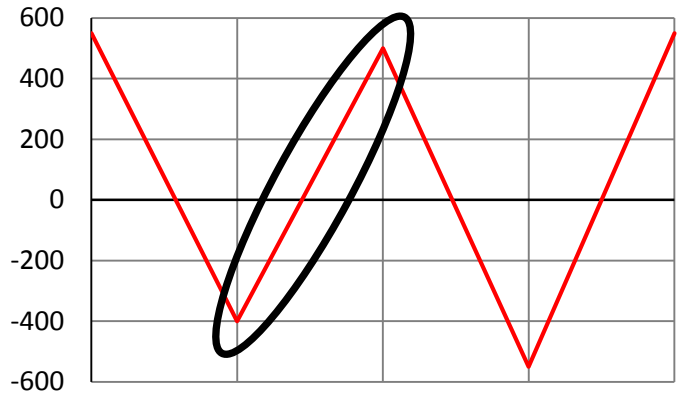
$$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$$

$$\sigma_2 = \sigma_1 - \Delta\sigma$$

$$\varepsilon_2 = \varepsilon_1 - \Delta\varepsilon$$



notice directions!

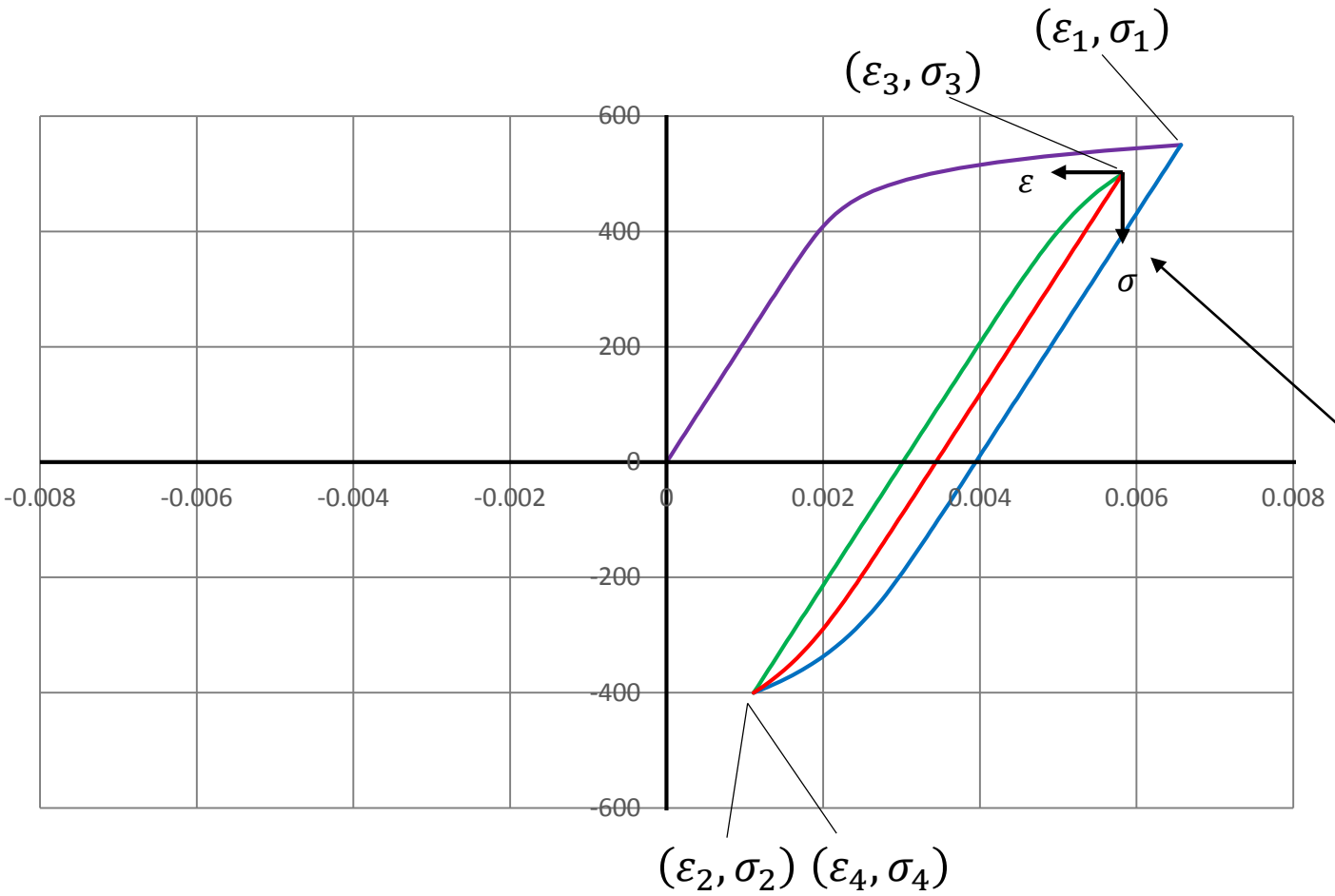


$$\Delta\sigma = 900 \text{ MPa}$$

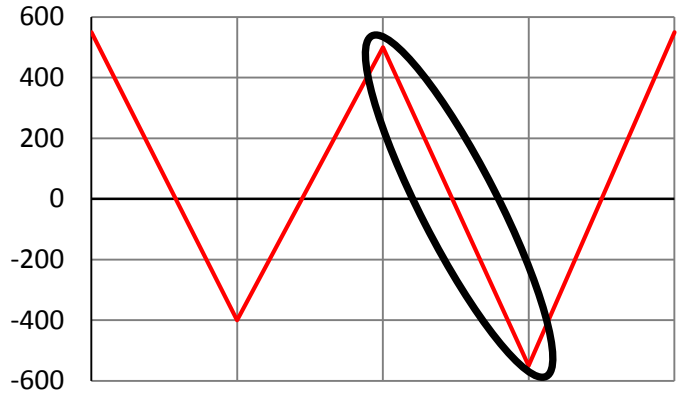
$$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$$

$$\sigma_3 = \sigma_2 + \Delta\sigma$$

$$\varepsilon_3 = \varepsilon_2 + \Delta\varepsilon$$



notice directions!



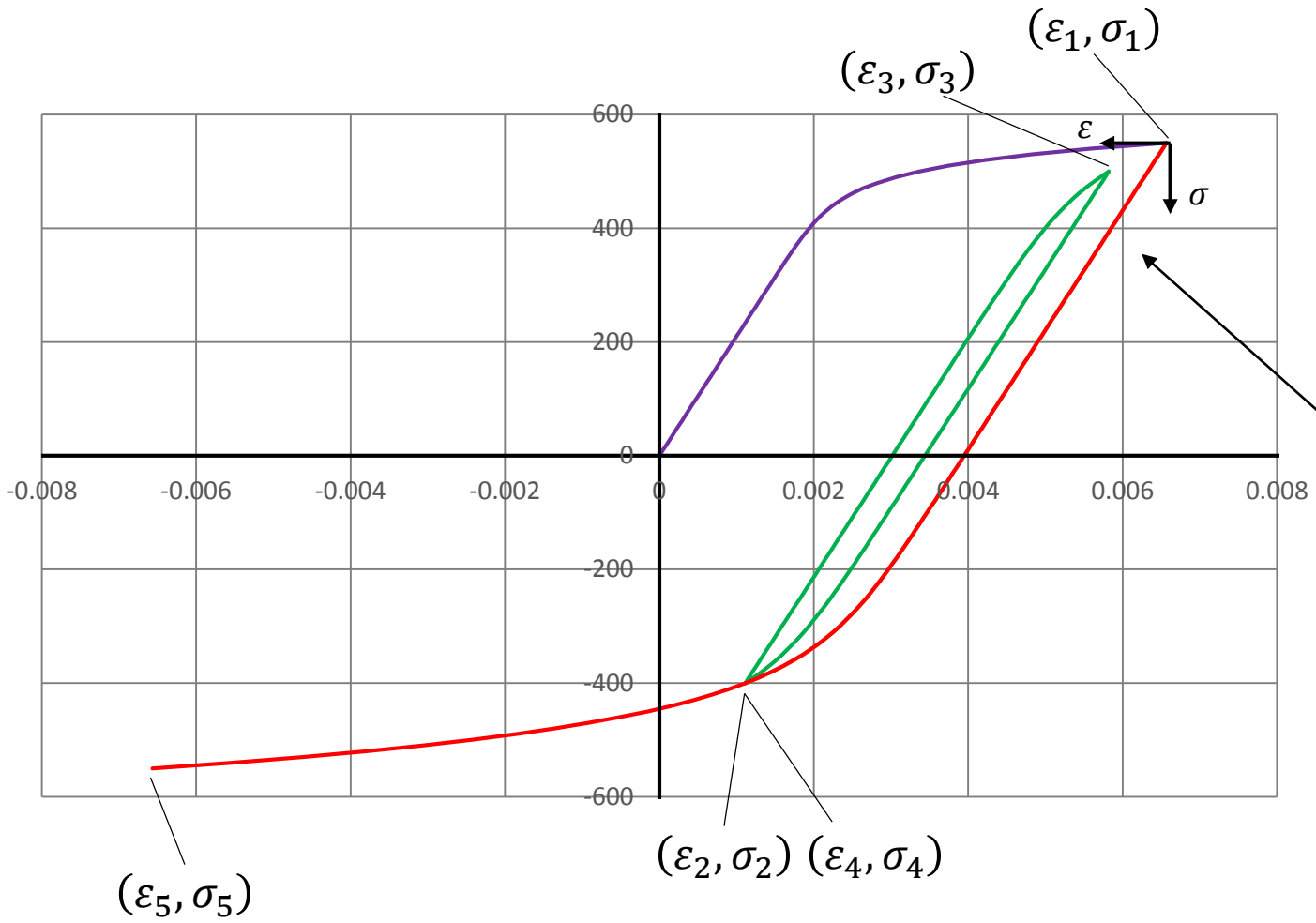
Actual $\Delta\sigma$ would be 950 MPa but inner loop is closed at 900 MPa. Therefore:

$$\Delta\sigma = 900 \text{ MPa}$$

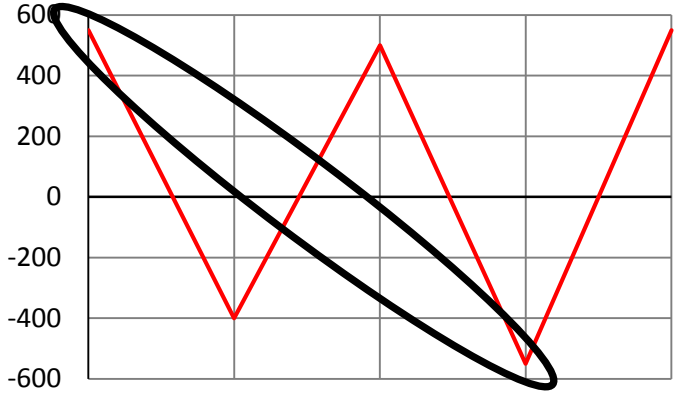
$$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$$

$$\sigma_4 = \sigma_3 - \Delta\sigma$$

$$\varepsilon_4 = \varepsilon_3 - \Delta\varepsilon$$



notice directions!



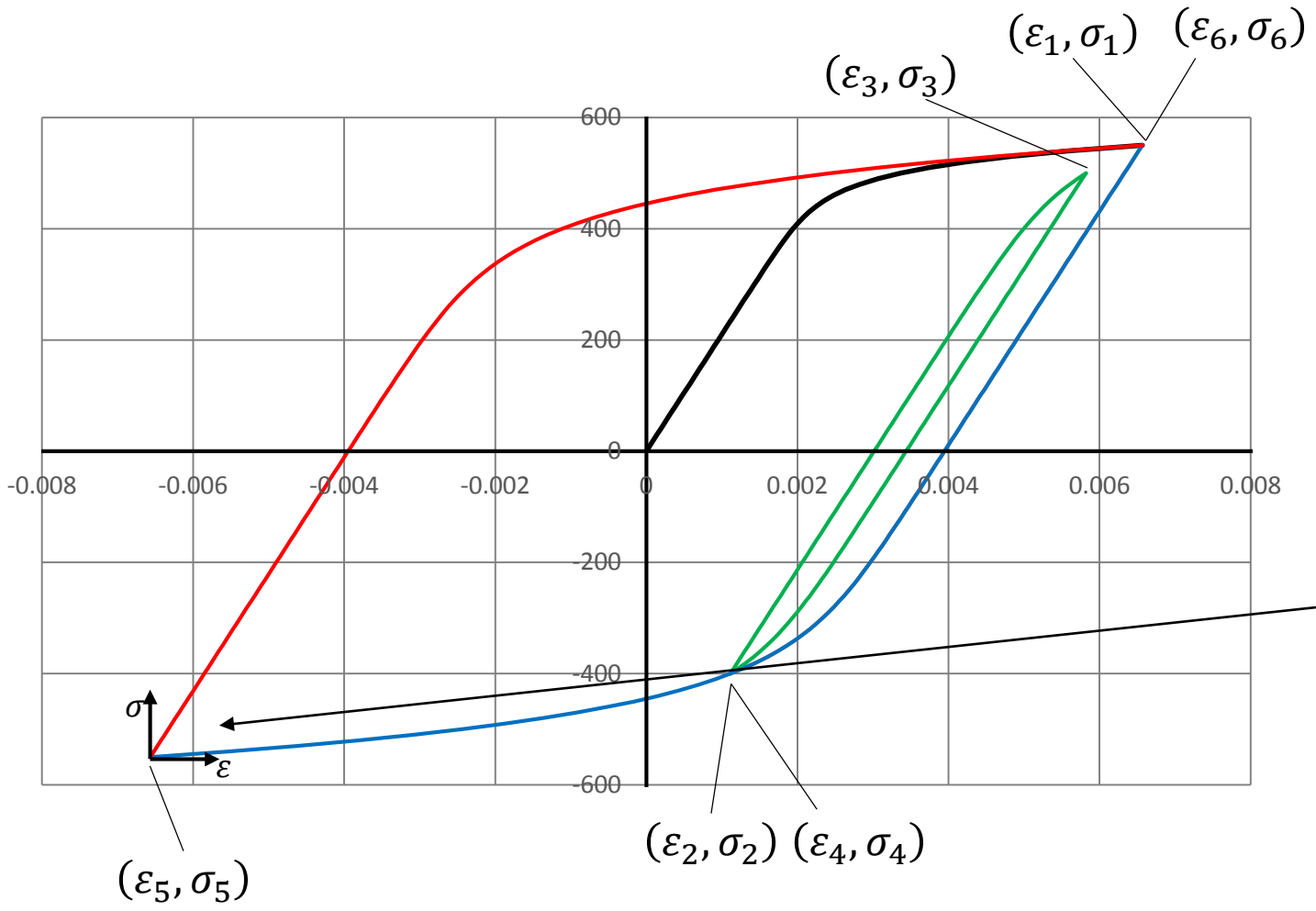
After inner loop is closed, continue from previous reversal point:

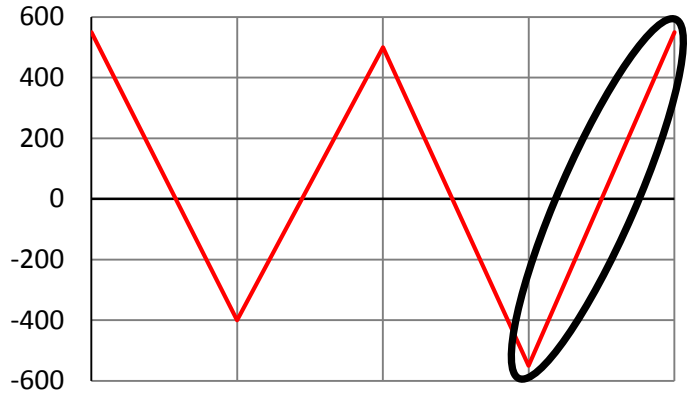
$$\Delta\sigma = 1100 \text{ MPa}$$

$$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$$

$$\sigma_5 = \sigma_1 - \Delta\sigma$$

$$\varepsilon_5 = \varepsilon_1 - \Delta\varepsilon$$





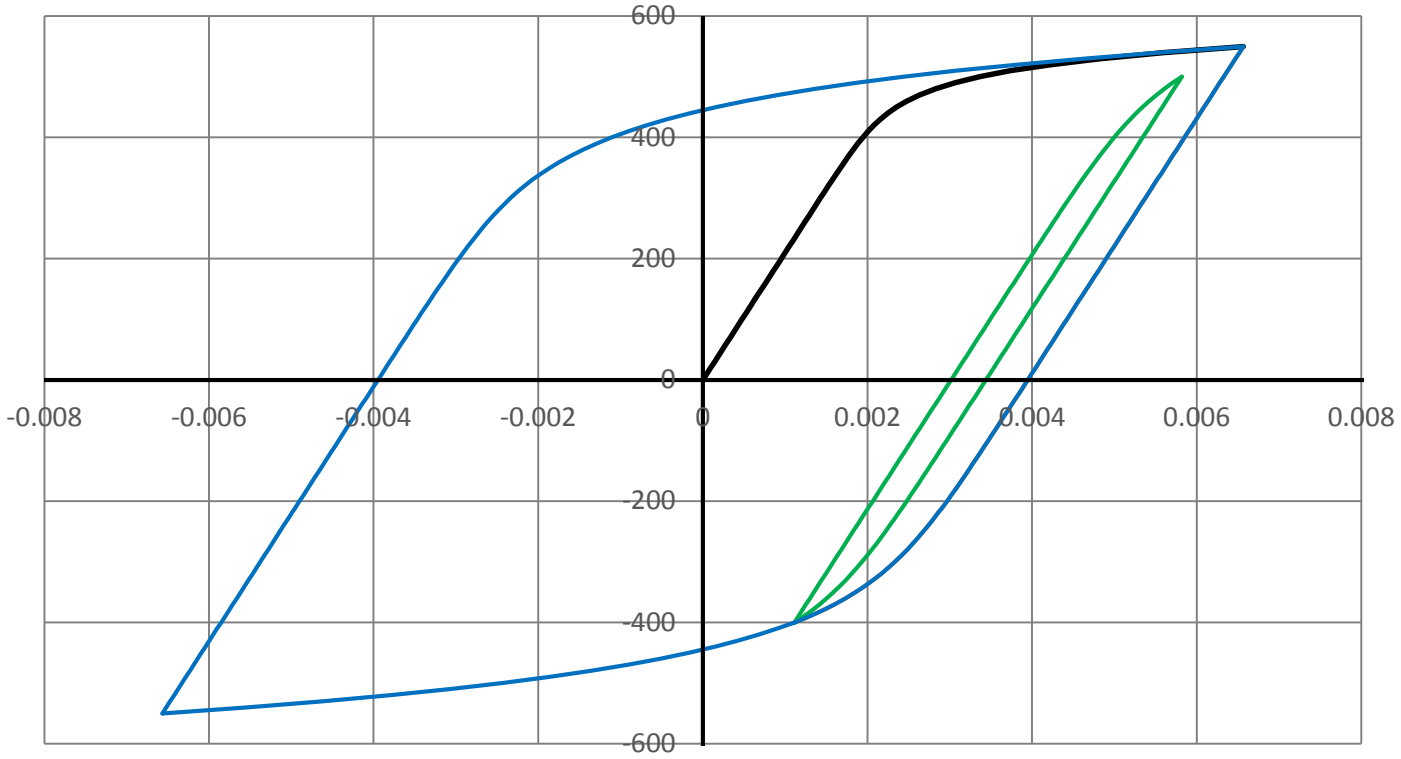
notice directions!

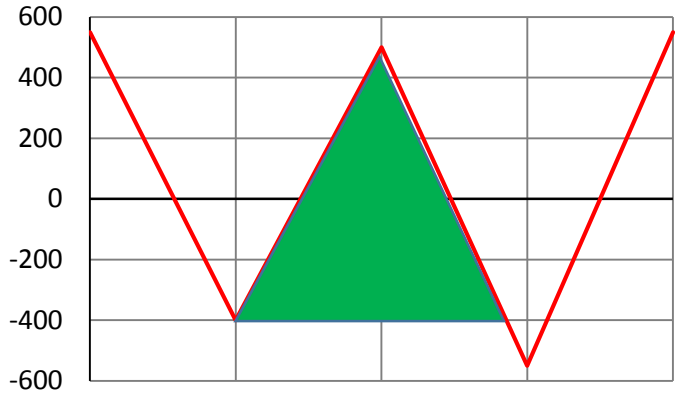
$$\Delta\sigma = 1100 \text{ MPa}$$

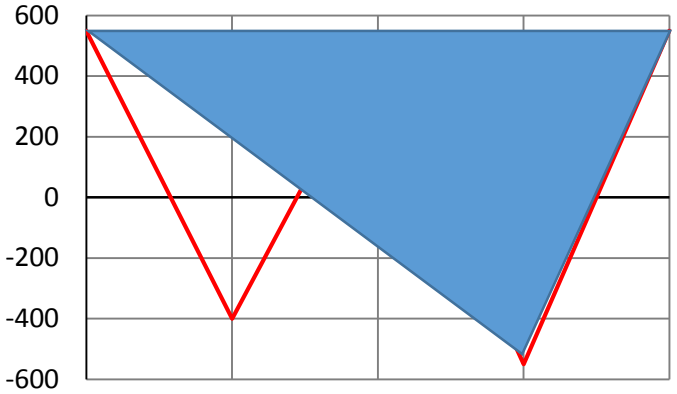
$$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$$

$$\sigma_6 = \sigma_5 - \Delta\sigma$$

$$\varepsilon_6 = \varepsilon_5 - \Delta\varepsilon$$


600
400
200
0
-200
-400
-600
-0.008
-0.006
-0.004
-0.002
0
0.002
0.004
0.006
0.008


600
400
200
0
-200
-400
-600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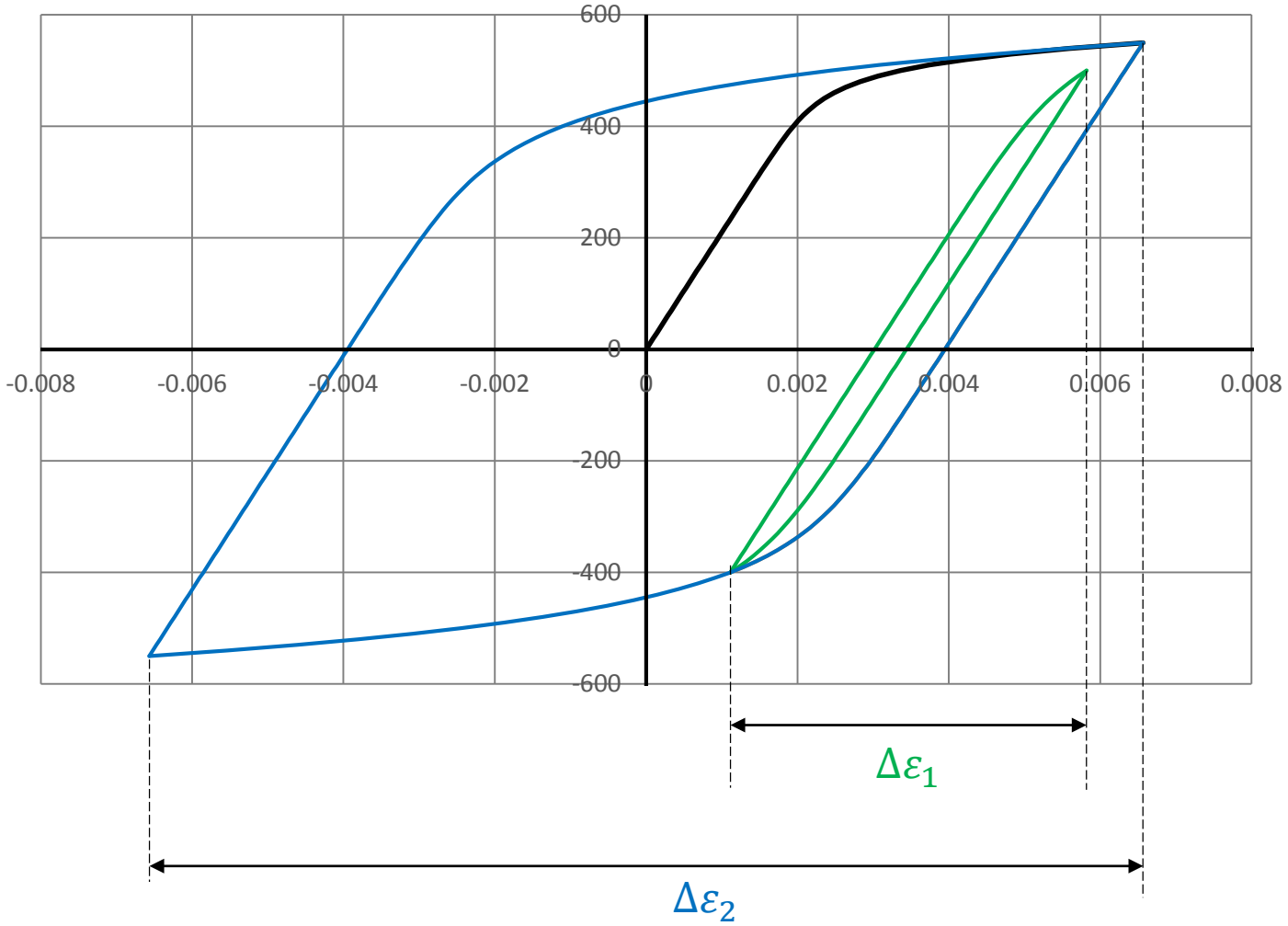
400
200
0
-200
-400
-600


600
400
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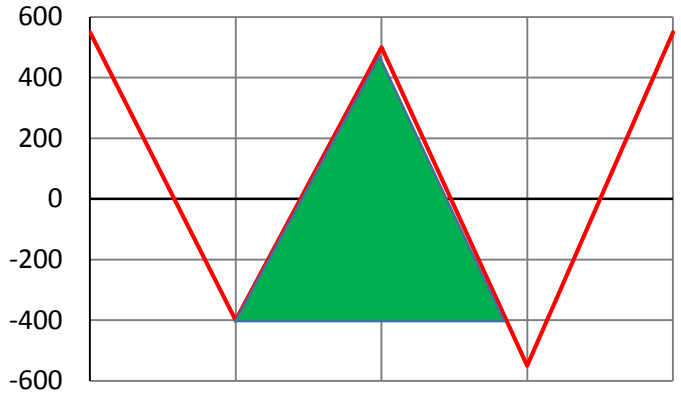
-200
-400
-600
-0.008
-0.006
-0.004
-0.002
0
0.002
0.004
0.006
0.008
$\Delta\varepsilon_1$
$\Delta\varepsilon_2$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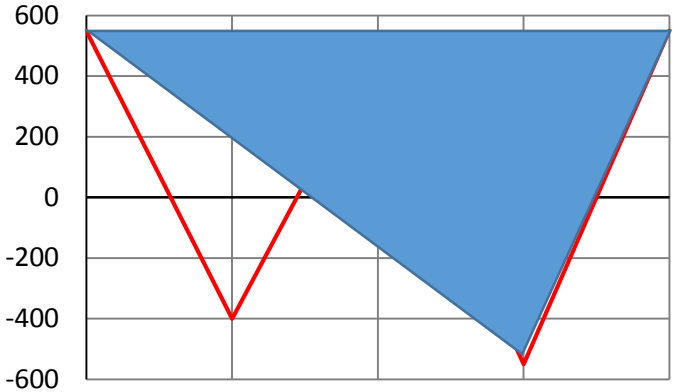
-600


600
400
200
0
-200
-400
-600