6.6 In order to compute the elongation of the Ni wire when the 300 N load is applied we must employ

Equations 6.1, 6.2, and 6.5. Solving for Δl and realizing that for Ni, $E = 207$ GPa (30×10^6 psi) (Table 6.1),

$$\Delta l \;=\; l_0 \varepsilon \;=\; l_0 \frac{\sigma}{E} \;=\; \frac{l_0 F}{E A_0} = \frac{l_0 F}{E \pi \left(\dfrac{d_0}{2} \right)^2} = \frac{4 l_0 F}{E \pi d_0^2}$$

$$= \; \frac{(4)(30 \text{ m})(300 \text{ N})}{\left(207 \times 10^9 \text{ N/m}^2 \right)(\pi)\left(2 \times 10^{-3} \text{ m} \right)^2} = 0.0138 \text{ m} = 13.8 \text{ mm (0.53 in.)}$$