$$0.01 \text{ nm} / \sqrt{H_2} = \lambda$$

$$\Rightarrow \underset{\text{(amplitude)}}{A} = \lambda \sqrt{f_{res}} = (10^{-11})\sqrt{2252}$$
$$= 4.74 \times 10^{-10} \text{ m}$$

$$\theta = \frac{A}{R} = \frac{A}{4 \times 10^{-3} \text{ m}} = 1.186 \times 10^{-7} \text{ rad}$$

$$F = \frac{T}{R} = \frac{K\theta}{R} = \frac{k\theta R}{R} = kA$$
(K: torsional; k: regular spring const.; as expected)

$$\Rightarrow F = (0.503)(4.74 \times 10^{-10})$$
$$= 2.3 \times 10^{-10} \text{ N}$$