A) $500 \frac{emu}{cm^3} = \frac{X}{atom} \cdot \frac{4\ atoms}{(3.524\text{Å})^3} \cdot \frac{0.927 \times 10^{-20}\ emu}{\mu_B}$

$\therefore$ $X = 0.60\ \mu_B$

B) $K_{shape} = 2\pi M_S^2 = 2\pi (500\ emu/cm^3)^2$

$\therefore$ $K_{shape} = 1.6 \times 10^6\ ergs/cm^3$

C) The Ni monolayer will experience a strain

$e_{xx} = e_{yy} = \frac{(3.615 - 3.524)\text{Å}}{3.615\text{Å}} = 0.025$

Conservation of atomic volume implies:

$e_{zz} = -0.05$

$\therefore$ $\sigma = -0.05 \times 10^{12} \frac{ergs}{cm^3}$ with $\gamma_z = 1$, $\gamma_x = \gamma_y = 0$

$\therefore$ $E_{me} = -\frac{3}{2}(-46 \times 10^{-6})(-5 \times 10^{10} \frac{ergs}{cm^3}) \alpha_z^2$

$= -3.5 \times 10^6 \frac{ergs}{cm^3} \alpha_z^2$

$\therefore$ Easy axis lies along $\hat{z}$

$K_U = 3.5 \times 10^6\ ergs/cm^3$.

D) The remaining anisotropy is the crystalline anisotropy (including interfacial anisotropy) that derives from the spin orbit interaction.

E) $H_{sw} = H_K = \frac{2K}{M} \rightarrow H_{sw} = 10\ kOe$

F) $\vec{J} = -\hat{z}\ \frac{0.6 \cdot 2 \cdot 1.6 \cdot 10^{-19}\ C}{(3.615\ \text{Å})^2 \cdot n\ S}$

$\vec{J} = -1.5\ A/m^2\ \hat{z}$

G) True switching current must also overcome anisotropy energy barrier and dissipation during switching (damping).