

# 1 Results of Hughes, Peter - Spacecraft Attitude Dynamics

$\mathbf{M}$  is torque,  $\mathbf{m}$  is commanded magnetic dipole moment vector generated by the coils, and  $\mathbf{b}$  is the local geomagnetic field.

$$\mathbf{M} = \mathbf{m} \times \mathbf{b}$$

$\hat{\mathbf{b}} = \mathbf{b}/\|\mathbf{b}\|$  is the unit vector parallel to the local geomagnetic vector.

$$\mathbf{M} = -k_{\omega} \left( \mathbb{I}_3 - \hat{\mathbf{b}}\hat{\mathbf{b}}^T \right) \boldsymbol{\omega}$$

Since we can only control  $\mathbf{m}$  we set  $\mathbf{m}$  to be

$$\mathbf{m} = \frac{1}{\|\mathbf{b}\|^2} (\mathbf{b} \times \mathbf{M})$$