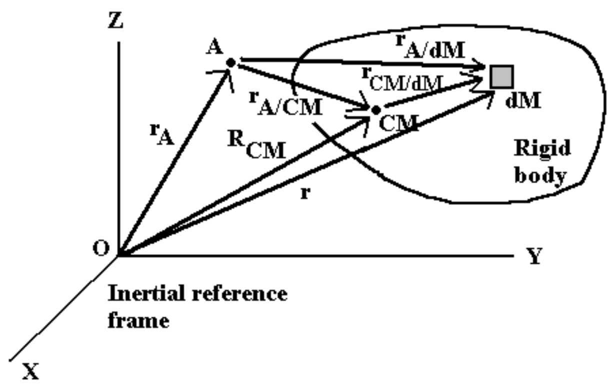

Forms of Euler's equation for a rigid body:

$$\mathbf{M}_A = \frac{d\mathbf{H}_A}{dt} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_{CM}}{dt} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_A}{dt} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_A$$

Proof that the first two equations and the first and third equations are the same:

$$\mathbf{M}_A = \frac{d\mathbf{H}_A}{dt} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d}{dt}\Big(\underbrace{\mathbf{H}_{CM} + \mathbf{r}_{A/CM} \times M\dot{\mathbf{R}}_{CM}}_{\text{This was the substitution I failed to make in my office...}}\Big) + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_{CM}}{dt} + \dot{\mathbf{r}}_{A/CM} \times M\dot{\mathbf{R}}_{CM} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_{CM} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_{CM}}{dt} + \dot{\mathbf{r}}_{A/CM} \times M\dot{\mathbf{R}}_{CM} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_{CM}}{dt} + \left(\dot{\mathbf{R}}_{CM} - \dot{\mathbf{R}}_A\right) \times M\dot{\mathbf{R}}_{CM} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_{CM}}{dt} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_{CM}$$

$$\mathbf{M}_A = \frac{d\mathbf{H}_A}{dt} + \dot{\mathbf{R}}_A \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_A}{dt} + \left(\dot{\mathbf{R}}_{CM} - \dot{\mathbf{r}}_{A/CM}\right) \times M\dot{\mathbf{R}}_{CM}$$
$$= \frac{d\mathbf{H}_A}{dt} + \mathbf{r}_{A/CM} \times M\ddot{\mathbf{R}}_A$$