

• We wish to expand $\vec{\nabla} \times (\vec{F} \times \vec{G})$

$$\vec{\nabla} \times (\vec{F} \times \vec{G}) = \epsilon_{ijk} \partial_j \{ \vec{F} \times \vec{G} \}_k$$

$$= \epsilon_{ijk} \partial_j \epsilon_{klm} F_l G_m$$

$$= \epsilon_{ijk} \epsilon_{klm} \partial_j F_l G_m$$

$$= (\delta_{il} \delta_{jm} - \delta_{im} \delta_{jl}) \partial_j F_l G_m$$

$$= \partial_j F_i G_j - \partial_j F_j G_i$$

$$= F_i \partial_j G_j + G_j \partial_j F_i - G_i \partial_j F_j - F_j \partial_j G_i$$

$$= \vec{F} (\vec{\nabla} \cdot \vec{G}) + (\vec{G} \cdot \vec{\nabla}) \vec{F} - \vec{G} (\vec{\nabla} \cdot \vec{F}) - (\vec{F} \cdot \vec{\nabla}) \vec{G}$$