

Homework 5 - Bases and coordinates

Q5.1. Write down Maxwell's equations in spherical polar coordinates.

Q5.2. Show that

$$\underline{\nabla} \cdot \vec{v} = \frac{1}{\epsilon_{1\dots N}} \frac{\partial}{\partial x^\alpha} (\epsilon_{1\dots N} v^\alpha) \quad (\text{Q5.2.1})$$

and hence write down $\underline{\nabla} \cdot \vec{v}$ in three dimensional spherical polar coordinates. Compare with the traditional vector calculus formula and explain the difference.