UNIVERSITY OF MISSISSIPPI
Department of Physics and Astronomy
Electromagnetism II (Phys. 402) — Prof. Leo C. Stein — Spring 2020

Problem Set 4

Due: Wednesday, Mar. 4, 2020, by 5PM

As with research, feel free to collaborate and get help from each other! But the solutions you hand in must be your own work. All book problem numbers refer to the third edition of Griffiths, unless otherwise noted. I know we don't all have the same edition, so I also briefly describe the topic of the problem.

1. Griffiths problem 9.2 (Standing waves are superposed traveling waves).
2. Griffiths problem 9.5 (Wave incident on a boundary where two materials meet).
3. Griffiths problem 9.8 (Circularly polarized wave).
4. Griffiths problem 9.9a-b (The real $\boldsymbol{E}$ and $\boldsymbol{B}$ fields from two example monochromatic plane waves).
5. Griffiths problem 9.12 (The Maxwell stress tensor due to a monochromatic plane wave traveling in the z direction).
6. **Stress in index notation** (extra credit). Suppose you have a monochromatic plane wave where the direction and k-number are given by the vector $\boldsymbol{k}$, or k_i in index notation; and this wave is linearly polarized with unit polarization vector $\hat{\boldsymbol{e}}$, or $\hat{e}_i$ in index notation, where $\boldsymbol{k} \cdot \hat{\boldsymbol{e}} = 0 = k_i \hat{e}_i$. Find the Maxwell stress tensor T_{ij} in index notation, in terms of the above quantities.