Transformed E&M I materials

Multipole Expansion
(Griffiths Chapter 3)

TIMELINE

Prof A covers this in lectures 19,20.
Prof B. covers this in lecture 16,17.
Transformed course covered in lectures 19-21.

LEARNING GOALS

1. Students should be able to explain when and why approximate potentials are useful.
2. Students should be able to identify and calculate the lowest-order term in the monopole expansion (i.e., the first non-zero term).
3. Students should be able to sketch the direction and calculate the dipole moment of a given charge distribution.

CLASS ACTIVITIES

Tutorial
Multipole expansion: "Discrete" activity
Oregon State University
Students work in small groups to create power series expansions for the electrostatic potential due to two electric charges separated by a distance D.

Griffiths by Inquiry (Lab 6): Multipole expansions

Discussion
Questions for lecture (from UIUC):

1.) Why should we care about approximate solutions for the scalar potential V(r) and/or E(r)?
2.) What are electric multipole moments of an electric charge distribution?
3.) When is it appropriate to use such approximate solutions for the scalar potential V(r) and/or E(r)?