

Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Sorting Category: M7b. (T)

**Transversality of Electromagnetic Waves in the
Calculus–Based Introductory Physics Course** LIOR M. BURKO,
University of Alabama in Huntsville — Introductory calculus–based
physics textbooks state that electromagnetic waves are transverse and
list many of their properties, but most such textbooks do not bring forth
arguments why this is so. Both physical and theoretical arguments are
at a level appropriate for students of courses based on such books, and
could be readily used by instructors of such courses. Here, we discuss
two physical arguments (based on polarization experiments and on lack
of monopole electromagnetic radiation), and the full argument for the
transversality of (plane) electromagnetic waves based on the integral
Maxwell equations. We also show, at a level appropriate for the intro-
ductory course, why the electric and magnetic fields in a wave are in
phase and the relation of their magnitudes. We have successfully inte-
grated this approach in the calculus–based introductory physics course
at the University of Alabama in Huntsville.

Prefer Oral Session
 Prefer Poster Session

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Date submitted: 09 Jan 2009

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