Abstract Submitted
for the SES17 Meeting of
The American Physical Society

Energy flow of electric dipole radiation between parallel mirrors ZHANGJIN XU, HENK F. ARNOLDUS, Mississippi State University — We have studied the energy flow patterns of the radiation emitted by an electric dipole located between parallel mirrors. It appears that the field lines of Poynting vector can have very intricate structures, including many singularities and vortices. The flow line patterns depend on the distance between the mirrors, the distance of the dipole to one of the mirrors and the angle of oscillation of the dipole moment. For the simplest case of a dipole moment oscillating perpendicular to the mirrors, singularities appear at regular intervals along the direction of propagation. For a dipole oscillating under a finite angle with the surface normal, the radiation tends to swirl around the dipole before travelling off parallel to the mirrors. For relatively large mirror separations, vortices appear in the pattern. When the dipole is off-centered with respect to the midway point between the mirrors, the flow line structure becomes more complicated, with many vortices in the pattern, and tiny loops near the dipole. We have also investigated the locations of the vortices and singularities, and these can be found without any specific knowledge about the flow lines. This provides an independent means of studying the propagation of dipole radiation between mirrors.

Zhangjin Xu
Mississippi State University

Date submitted: 11 Oct 2017 Electronic form version 1.4