8H9   Relativistic Effects on Waves in Plasmas.*

K.H. SPATSCHEK, Essen U., F.R. Germany -- The effect of relativistic electron-mass variation on the propagation of electromagnetic radiation as well as electron plasma waves is considered. Using a variational principle, the nonlinear refractive index is obtained up to fourth order in the electric field amplitude. It is shown that within the thin-beam approximation the complex electric field envelope of the em radiation obeys a nonlinear Schrödinger equation with an attractive self-consistent potential. For the electrostatic modes, the variational principle - including thermal dispersive terms - is used to find the possible final states of the linearly unstable modes. The effect of higher order nonlinearities is discussed.