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Microturbulent magnetoactive plasmas and polarized radiation from the solar corona

W.N.-C. Sy

A semiclassical theory of weak nonlinear interactions in a magnetoactive plasma is developed neglecting effects of binary collisions (Chapters 2 and 4). Thomson scattering of magnetoionic waves by nonrelativistic electrons and inverse Compton scattering of magnetoionic waves by relativistic electrons are discussed together with illustrative examples. Scattering by ions and by electrons in a maxwellian plasma are treated and compared. Examples of nonlinear scattering of magnetoionic waves by thermal plasma ions are studied.

A theory of polarized radiation arising from nonlinear conversion of microturbulences in electron plasma waves and in electrostatic electron cyclotron waves is developed (Chapter 5). On a simplifying assumption about the turbulence spectrum of electron plasma waves, polarized radiation arising from the "plasma emission processes" in a weak background magnetic field is studied in detail. Polarized radiation from nonlinear conversion of a microturbulence in electrostatic electron cyclotron waves is discussed for cases with either weak or strong background magnetic fields.

Type I solar radio bursts and associated noise storm phenomena are investigated in Chapter 6. A model of type I solar radio bursts is constructed, based on the "plasma hypothesis" and including induced effects. A mechanism is proposed to explain the strong circular polarization of type I bursts from source regions where the background coronal magnetic field is expected to be weak.

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