A study of the nonlinear dispersive properties and the turbulent behaviour of plasmas is presented in this thesis. The presence of a small fraction of cold electrons in a plasma is found to affect the spectrum of modulationally unstable Ion-Acoustic Waves. The envelope hole state of the Ion-Acoustic waves is found to be broadened by the presence of random inhomogeneities. In a collisional plasma, obliquely propagating Langmuir waves are modulationally stable and the angle between the directions of propagation and modulation affects the envelope hole state. The plane wave solutions of the Sine-Gordon equation are modulationally unstable, whereas those of the Nonlinear Klein-Gordon equation can be stable or unstable depending on the sign of the cubic nonlinear term. The stability of a generalized nonlinear dispersive wave equation (Hirota equation) and the Boussinesq equation against long-wave modulations and consequent envelope states are investigated. The saturation of the hot beam-plasma instability due to turbulent diffusion and the effect of particle thermal velocities on the nonlinear saturation and energy balance are discussed.