Contents

Pr	eam	ble	1	
1	Alfv	vén modes	4	
	1.1	Alfvén wave in ideal MHD	4	
	1.2	Anisotropic instabilities	7	
	1.3	Alfvén Ion Cyclotron mode	10	
	1.4	The quasi-perpendicular limit	12	
2	Schocks and discontinuities 1			
	2.1	Impossibility of a stationary gradient	17	
	2.2	Rankin-Hugoniot jump conditions	19	
	2.3	Discontinuities	23	
	2.4	Schocks	24	
3	Magnetic reconnection			
	3.1	The first reconnection models	26	
	3.2	The Harris kinetic equilibrium	30	
	3.3	The collisional tearing mode	33	
	3.4	The collisionless tearing mode	37	
4	Beam-plasma instabilities 42			
	4.1	Electrostatic modes	42	
	4.2	Type-3 radio bursts	46	
	4.3	Electromagnetic modes	48	
	4.4	The ion fore-schock	56	
Bi	bliog	graphy	60	
\mathbf{A}	Rec	alls on waves and instabilities in plasmas	62	
	A.1	General	62	
	A.2	Linear and non-linear modes	65	
	A.3	Plasma dispersion relation	66	
	A.4	Magnetic permeability of a plasma	67	
	A.5	Conductivity tensor and dielectric tensor	68	
	A.6	Spatial & temporal dispersion	69	
	A.7	Dissipation	71	
	A.8	Recalls of MHD	72	