



## TABLE OF CONTENTS

PREFACE	XI
LIST OF SYMBOLS AND CONSTANTS	XIII
CHAPTER 1. INTRODUCTION	1
1.1 Outline of Book	1
1.2 What is a Prominence?	2
1.3 Historical Background	11
1.4 Morphological Classifications	14
CHAPTER 2. INTERPRETATION OF OBSERVATIONAL DATA	19
2.1 Spectroscopy—Atomic Physics	19
2.1.1 Basic Notations	19
2.1.2 Radiative Transfer, General Formalism	22
2.1.3 Radiative Transfer in Prominences	25
2.1.4 Continuous Radiation in Prominences	30
2.1.5 Line Profiles	35
2.1.6 Quantum Numbers and Selection Rules	41
2.2 Magnetohydrodynamics—Plasma Physics	44
2.2.1 Magnetic Field Observations	45
2.2.2 Elements of Magnetohydrodynamics	54
2.3 Waves in a Plasma	69
2.3.1 Acoustic Waves	70
2.3.2 Magnetic Waves	71
2.3.3 Magnetoacoustic Waves	71
2.3.4 Gravity Waves	72
2.3.5 Plasma Oscillations	74
2.4 Modeling—Computer Simulation	76
CHAPTER 3. PHYSICAL PARAMETERS OF THE PROMINENCE PLASMA	81
3.1 Temperature	81
3.2 Spectroscopic Classifications	85
3.3 Density	88
3.4 Degree of Ionization	91

3.5 Magnetic Field	91
3.6 Motions	95
3.6.1 Quiescent Prominences	95
3.6.2 Active Prominences	105
3.7 The Hvar Reference Model	110
<b>CHAPTER 4. FORMATION OF PROMINENCES</b>	<b>113</b>
4.1 Filament Channels and Magnetic Arcades	114
4.2 Photospheric Motions and Filament Formation	121
4.3 Condensations	122
4.3.1 Condensation as a Thermal Instability	123
4.3.2 Condensation of Prominences	128
4.4 Injections	142
4.4.1 Siphon-Type Injections	143
4.4.2 Diamagnetic Effects	148
4.4.3 Surges, Spicules, and Fibrils	151
4.4.4 Particle Acceleration	158
<b>CHAPTER 5. PROMINENCE MODELS</b>	<b>167</b>
5.1 The Location of Prominences	167
5.2 Radio Waves and Prominences	170
5.3 Fine Structure of the Prominence Plasma	172
5.3.1 Quiescent Prominences	173
5.3.2 Active Prominences	182
5.4 Early Models, Historical Notes	183
5.4.1 Some General Comments on Magnetohydrostatic Models	184
5.4.2 Field Configurations Capable of Supporting Prominences	185
5.5 Global Magnetohydrostatic Equilibrium	191
5.5.1 Support in Normal Polarity Fields	192
5.5.2 Support in Inverse Polarity Fields	198
5.5.3 The Importance of Dips in the Field Lines	200
5.6 Dynamic Support	210
5.7 Prominence Feet	213
5.7.1 Observations, Empirical Models	214
5.7.2 Physical Models	216
5.8 Internal Equilibrium	219
5.8.1 Magnetohydrostatic Equilibrium	220
5.8.2 Thermal Equilibrium	223
5.9 Fine Structure Revisited	233

**TABLE OF CONTENTS****IX**

<b>CHAPTER 6. THE DEATH OF PROMINENCES</b>	<b>237</b>
6.1 Comments on Active Prominences	237
6.2 Thermal Equilibrium Breakdown	238
6.2.1 Thermal Disparitions Brusques	240
6.3 Magnetohydrostatic Equilibrium Breakdown	242
6.3.1 Prominence Stability	244
6.3.2 Destabilization of Prominences	249
6.3.3 Dynamic Disparitions Brusques	258
6.4 Coronal Mass Ejections	264
6.5 Global Magnetic Field Restructuring	267
6.5.1 From Local to Global Destabilization	267
6.5.2 Low's Model	269
6.5.3 The Disparition Brusque Revisited	269
<b>REFERENCES</b>	<b>275</b>
<b>AUTHOR INDEX</b>	<b>297</b>
<b>SUBJECT INDEX</b>	<b>305</b>