

Contents

<i>List of contributors</i>	<i>page vii</i>
<i>Preface</i>	<i>ix</i>
Part I Physical Processes and Numerical Methods Common to Structure Formations in Astrophysics	1
1 The physics of turbulence <i>E. Lévéque</i>	3
2 The numerical simulation of turbulence <i>W. Schmidt</i>	20
3 Numerical methods for radiation magnetohydrodynamics in astrophysics <i>R. Klein and J. Stone</i>	37
4 The role of jets in the formation of planets, stars and galaxies <i>R. E. Pudritz, R. Banerjee and R. Ouyed</i>	84
5 Advanced numerical methods in astrophysical fluid dynamics <i>A. Hujeirat and F. Heitsch</i>	110
Part II Structure and Star Formation in the Primordial Universe	131
6 New frontiers in cosmology and galaxy formation: challenges for the future <i>R. Ellis and J. Silk</i>	133
7 Galaxy formation physics <i>T. Abel, G. Bryan and R. Teyssier</i>	159
8 First stars: formation, evolution and feedback effects <i>V. Bromm, A. Ferrara and A. Heger</i>	180

vi	Contents	
Part III	Contemporary Star and Brown Dwarf Formation	203
9	Diffuse interstellar medium and the formation of molecular clouds <i>P. Hennebelle, M.-M. Mac Low and E. Vazquez-Semadeni</i>	205
10	The formation of distributed and clustered stars in molecular clouds <i>S. T. Megeath, Z.-Y. Li and Å. Nordlund</i>	228
11	The formation and evolution of prestellar cores <i>P. André, S. Basu and S. Inutsuka</i>	254
12	Models for the formation of massive stars <i>M. R. Krumholz and I. A. Bonnell</i>	288
Part IV	Protoplanetary Disks and Planet Formation	321
13	Observational properties of disks and young stellar objects <i>G. Duchene, F. Menard, J. Muzerolle and S. Mohanty</i>	323
14	Structure and dynamics of protoplanetary disks <i>C. P. Dullemond, R. H. Durisen and J. C. B. Papaloizou</i>	350
15	Planet formation and evolution: theory and observations <i>Y. Alibert, I. Baraffe, W. Benz, G. Laughlin and S. Udry</i>	378
16	Planet formation: assembling the puzzle <i>G. Wurm and T. Guillot</i>	410
Part V	Summary	425
17	Open issues in small- and large-scale structure formation <i>R. S. Klessen and M.-M. Mac Low</i>	427
18	A final word <i>E. E. Salpeter</i>	441