

Contents

List of figures

List of tables

Preface

Acknowledgements

Glossary of orbital terms

Common abbreviations

1. What is an Asteroid
 - 1.1. Designation and naming
2. Discovery
 - 2.1. The Titius-Bode relationship
 - 2.2. Main belt asteroids
 - 2.3. Trojans asteroids
 - 2.4. Near Earth asteroids
 - 2.5. Centaurs
 - 2.6. Trans-Neptunian objects
3. Orbits of the asteroids
 - 3.1. Main belt
 - 3.1.1. Mars crossing asteroids
 - 3.2. Trojans
 - 3.3. Near Earth asteroids
 - 3.3.1. Apollo class
 - 3.3.2. Amor class and sub-types
 - 3.3.3. Atira asteroids
 - 3.3.4. Atens
 - 3.4. Centaurs
 - 3.5. Vulcanoids
 - 3.6. Trans-Neptunian objects
4. Orbital evolution
 - 4.1. Gravitational dynamics
 - 4.2. Non-gravitational forces
 - 4.2.1. Radiation pressure
 - 4.2.2. Poynting-Robertson drag
 - 4.2.3. Yarkovsky and YORP effects
 - 4.2.4. Asymmetric outgassing
 - 4.3. Collisions
5. Asteroid families
6. Composition and nature
 - 6.1. Rotation and albedo
 - 6.2. Spectral taxonomy and composition
 - 6.3. Asteroidal and main belt mass
 - 6.4. Disrupted and active asteroids and main belt comets
7. Space probe missions
8. Genesis of the asteroids
 - 8.1. Solar system planet and asteroid formation
 - 8.2. Comet evolution to asteroids; the Damocloids
 - 8.3. Binary asteroids

9. Threats
 - 9.1. Asteroidal impacts
 - 9.2. Potentially hazardous asteroids collision risks
 - 9.2.1. Asteroids on collisional paths
 - 9.2.2. Detection and monitoring
 - 9.2.3. Evaluation and communication
 - 9.2.4. Known threats and unknown dangers
 - 9.2.5. Recorded impacts
 - 9.2.6. Avoidance and mitigation
10. Appendices
 - 10.1 Tisserand criteria
 - 10.2 Tisserand's asteroid

Picture credits

Bibliography and suggested further reading

References and online sources and resources

List of figures

1. Minor planet Ceres
2. Minor planet Vesta
3. Trans-Neptunian planet Pluto
4. Main belt Kirkwood gaps
5. Main belt asteroid 253 Mathilde
6. Phobos, Mars' largest moon
7. Trojan asteroid orbits
8. Apollo and Amor classes orbits schematic
9. Aten and Atira orbits schematic
10. Aten asteroid 433 Eros
11. Orbit schematics for Hidalgo and Chiron
12. Poynting-Robertson drag
13. Yarkovsky effect
14. Collision scenarios
15. Collision outcomes
16. Main belt asteroid 243 Ida and moon Dactyl
17. Dactyl satellite moon of 243 Ida
18. Rochechouart lithic breccia

List of tables

1. Titius Bode relationship
2. Early main belt asteroid discoveries
3. Segments within main belt
4. A selection of Jovian and Neptunian trojans
5. Classes of near Earth asteroids
6. Sub-types of Amor asteroids
7. Orbital parameters for Hidalgo and Chiron centaurs
8. Hypothetical asteroid perturbation
9. Non-gravitational forces
10. Asteroid rotation tables
11. Characteristics of the key taxonomic classifications
12. Asteroid and main belt masses
13. Space missions to asteroids
14. Planned space missions to asteroids
15. Mass extinctions and corresponding asteroid collisions