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Astronomical Algorithms



Synopsis

Book by Meeus, Jean

Book Information

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Customer Reviews

Book by Meeus, Jean

This is a cookbook of algorithms for solving a variety of numerical problems that come up in astronomy. Explanations of why the author chose to do things a certain way are not on the agenda, but various numerical examples are. Programs are not included, although it is fairly easy to go from the algorithms presented to code. For that information I recommend the equally affordable Textbook on Spherical Astronomy. That book is a pleasure to read and was written with newcomers to the field in mind. Read that book first. It will tell you most of the "whys" omitted in this book. To understand some astronomical problems will require studying more than one chapter of this book. For instance, to calculate the altitude of the Sun for a given time on a given date at a given place, one must first convert the date and time to Julian Day (Chapter 7), then calculate the Sun's longitude for that instant (Chapter 25), its right ascension and declination (Chapter 13), the sidereal time (Chapter 12) and finally the required altitude of the Sun (Chapter 13). This book focuses on classical mathematical astronomy, although a few astronomy oriented mathematical techniques are dealt with, such as interpolation, fitting curves, and sorting data. Astrophysics is not a topic covered in this book. Also, it is plain that not all topics of mathematical astronomy could have been covered in this book. Thus, nothing is said about orbit determination, occultations of stars by the Moon,

meteor astronomy, or eclipsing binaries. The table of contents can be hard to track down, and there are no excerpts available on line, so I present the table of contents next:

Some Symbols and Abbreviations 51. Hints and Tips 72. About Accuracy 153. Interpolation 234. Curve Fitting 355. Iteration 476. Sorting Numbers 557. Julian Day 598. Date of Easter 679. Jewish and Moslem Calendars 7110. Dynamical Time and Universal Time 7711. The Earth's Globe 8112. Sidereal Time at Greenwich 8713. Transformation of Coordinates 9114. The Parallax Angle 9715. Rising, Transit and Setting 10116. Atmospheric Refraction 10517. Angular Separation 10918. Planetary Conjunctions 11719. Bodies in a Straight Line 12120. Smallest Circle Containing Three Celestial Bodies 12721. Precession 13122. Nutation and the Obliquity of the Ecliptic 14323. Apparent Place of a Star 14924. Reduction of Ecliptical Elements from One Equinox to Another One 15925. Solar Coordinates 16326. Rectangular Coordinates of the Sun 17127. Equinoxes and Solstices 17728. Equation of Time 18329. Ephemeris for Physical Observations of the Sun 18930. Equation of Kepler 19331. Elements of the Planetary Orbits 19732. Positions of the Planets 21733. Elliptic Motion 22334. Parabolic Motion 24135. Near-Parabolic Motion 24536. The Calculation of some Planetary Phenomena 24937. Pluto 26338. Planets in Perihelion and Aphelion 26939. Passages through the Nodes 27540. Correction for Parallax 27941. Illuminated Fraction of the Disk and Magnitude of a Planet 28342. Ephemeris for Physical Observations of Mars 28743. Ephemeris for Physical Observations of Jupiter 29344. Positions of the Satellites of Jupiter 30145. The Ring of Saturn 31746. Positions of the Satellites of Saturn 32347. Position of the Moon 33748. Illuminated Fraction of the Moon's Disk 34549. Phases of the Moon 34950. Perigee and Apogee of the Moon 35551. Passages of the Moon through the Nodes 36352. Maximum Declinations of the Moon 36753. Ephemeris for Physical Observations of the Moon 37154. Eclipses 37955. Semidiameters of the Sun, Moon and Planets 38956. Stellar Magnitudes 39357. Binary Stars 39758. Calculation of a Planar Sundial 401 Appendix I Constants 407 Appendix II Some Astronomical Terms 409 Appendix III Planets: Periodic Terms 413 Appendix IV Coefficients for the Heliocentric Coordinates of Jupiter to Neptune, 1998-2025 455 Index

About the book: I was looking for an algorithm for determining the solar declination for a given date, place & time (I'm writing a scientific paper), so I was stumbled to this book following a mountain of good recommendations and advices. This book is the *almost* perfect source of guidelines for those programmers, engineers and scientist that need to deal with astronomical predictions or related computations. Requires a more-than-basical math knowledge, this is *not* a beginners book, also doesn't have astronomical theory or programming examples for your favorite language. Regarding

the package: The book was very well packed in a small and rugged carton box; the book, along the proof of purchase was also covered with plastic protection. The package also included a small catalog of other astronomical books published by the same editor. I'm very happy with the deal with this seller, so I would recommend them at 100%.

great work, just that i am not the right person for it. bought it for information. way over my head :)

I bought this book with high hopes, and was not disappointed. It is clear, precise and very helpful in providing many algorithms and much needed explanations on calculating ephemerides. However, the calculations for the position of the sun was a little infuriating. I wanted a simple algorithm with less accuracy than suggested by Meeus. By extension, Meeus then refers to the user to other works of even greater accuracy for the calculation of the position of the sun. However, this is a minor point. The book is well-done and is valuable extension to the Astronomical Almanac, and Explanatory Supplement.

Well-written and easy to follow. Despite the lack of figures that could have clarified many concepts, the book is good enough to guide readers in the calculation of many astronomical variables.

Good stuff. I found no errors in any of their examples. I used a spreadsheet and was matching all their example answers. I specifically looked at moon position and phase and sun position.

If you love astronomy and programming then this is a must own book. Plenty of work to analyze. Great buy! Jean Meeus is a living legend.

I haven't tried any other books than this one, so perhaps take this with a grain of salt. But it has all the algorithms I need with the accuracy I need (for a work-related project). The explanations are very good.

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