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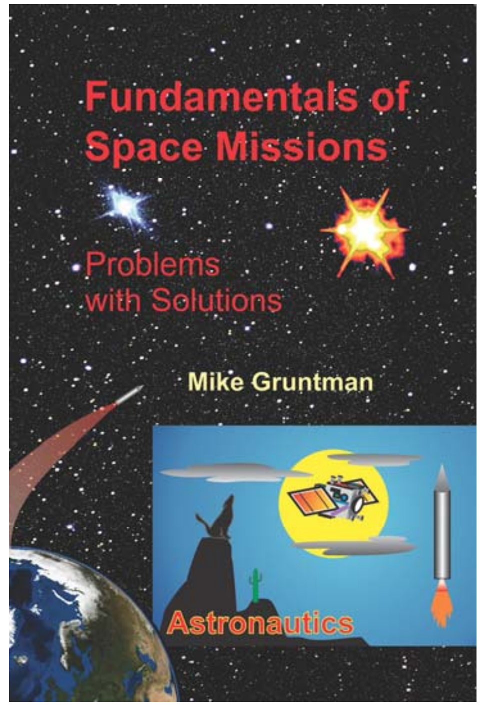
Fundamentals of Space Missions:

Problems with Solutions

Mike Gruntman

Interstellar Trail Press, California, 2022



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478 pages with 175+ figures; references
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This book includes more than 160 typical homework and exam problems that *were* given, *could* have been given, or *should* have been given (had the time allowed) in a graduate-level introductory astronautics "boot camp" course on the fundamentals of space systems at the University of Southern California.

The problems cover the first half of the course, focused on mission-related subjects such as the solar system, coordinate systems, space environment and interactions, the Earth, the gravitational field, orbital mechanics, common orbits, and mission geometry. All problems include detailed solutions. Consequently, it is a how-to guide for making basic estimates in planning and designing space missions and systems.

The book is for students and instructors in undergraduate and graduate courses in astronautical engineering. It will also serve as an aid for practicing space engineers and managers, especially system engineers, involved in the planning, design, and operation of space missions, space systems, and payloads.

About the author. Mike Gruntman is a professor of astronautics and the founder of a space engineering program at the University of Southern California (USC). He is an accomplished specialist actively involved in R&D programs in space science and space technology and has authored and coauthored more than 300 scholarly publications, including six books. Mike is an associate fellow of the American Institute of Aeronautics and Astronautics and a member of the International Academy of Astronautics

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Fundamentals of Space Missions: Problems with Solutions

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Chapter 2. Coordinate Systems, Time, Angles

Chapter 3. Space Environment and Interactions

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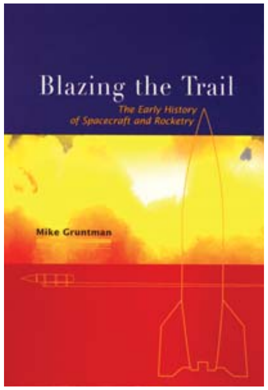

Winner of the Luigi Napolitano Award (2006) from the International Academy of Astronautics

Mike Gruntman, Blazing the Trail: The Early History of Spacecraft and Rocketry, AIAA, Reston, Va., 2004

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Mike Gruntman, Intercept 1961. The Birth of Soviet Missile Defense, AIAA, Reston, Va., 2015

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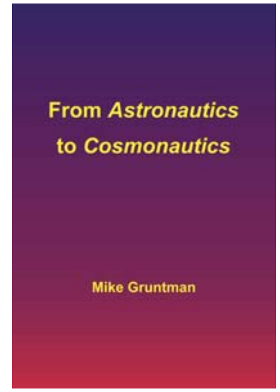
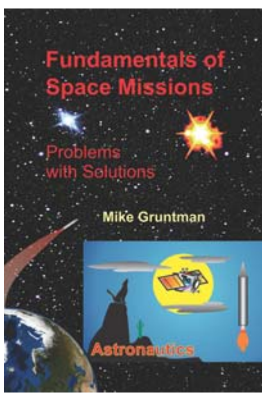


Nominated for the Eugene M. Emme Astronautical Literature Award (2007) of the American Astronautical Society

Mike Gruntman, From Astronautics to Cosmonautics. Space Pioneers Robert Esnault-Pelterie and Ary Sternfeld, Booksurge, North Charleston, S.C., 2007

ISBN 978-1-4196-7085-5
ASIN: B002E19WDO (Kindle)
84 pages, 24 photographs, 75 references



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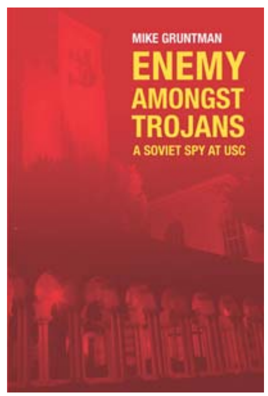

Mike Gruntman, Enemy Amongst Trojans. A Soviet Spy at USC (a WWII story), Figueroa Press, Los Angeles, Calif., 2010

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Mike Gruntman, My Fifteen Years at IKI, the Space Research Institute: Position-Sensitive Detectors and Energetic Neutral Atoms Behind the Iron Curtain, Interstellar Trail Press, 2022.

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