



The Space Environment and Its Effects on Space Systems (Aiaa Education Series)

By Vincent L. Pisacane

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This full-color textbook will help students and professionals understand the space environment and its impacts on spacecraft design, engineering, and performance. While the primary emphasis of the book is the Earth's environment and its effects on spacecraft, it also addresses the extraterrestrial environment and the effects of radiation on humans in space. The book begins with an introduction to the history of spacecraft failures, risk management, reliability and quality assurance techniques, and parts reliability. It goes on to provide an overview of the structure of the Sun; the structure, origin, and models of the geomagnetic field; gravitational field of the Earth; Earth's magnetosphere and radiation environment; neutral environment including fundamentals of the kinetic theory of gases; variation of pressure with altitude and hypoxia of humans; electromagnetic propagation; the effect of atomic oxygen on materials; plasma surrounding the Earth; transport and effects of photon and charged particle radiation on electronics and tissue; spacecraft contamination; techniques to mitigate debris impact; and heat transfer and thermal control of spacecraft. An appendix provides important astrodynamical constants and parameters of the celestial bodies in the solar system. Problem sets and examples are included, and a solution manual is available for instructors.

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- Sales Rank: #1078650 in Books
- Published on: 2008-05-15
- Original language: English
- Number of items: 1
- Dimensions: 1.00" h x 6.30" w x 9.10" l, 1.85 pounds
- Binding: Hardcover
- 300 pages

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