Tethers in Space Handbook Second Edition: A Comprehensive Guide to Tether Technologies and Applications

Tethers in Space Handbook, Second Edition: (May 1, 1989) by Dale W. Schaefer

★★★★★ 5 out of 5

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Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 261 pages

The Tethers in Space Handbook Second Edition is the most comprehensive and up-to-date guide to tether technologies and applications. Published in May 1989, this book provides a thorough overview of the history, theory, design, and development of tethers, as well as their potential applications in a variety of space missions.

Tethers are long, thin cables that can be used to connect two objects in space. They have a wide range of potential applications, including:

- **Spacecraft propulsion:** Tethers can be used to accelerate or decelerate spacecraft without the need for fuel.
- **Station keeping:** Tethers can be used to maintain spacecraft in a desired orbit.

- **Power generation:** Tethers can be used to generate electricity from the Earth's magnetic field.
- **Artificial gravity:** Tethers can be used to create artificial gravity in space.

The Tethers in Space Handbook Second Edition is a valuable resource for anyone interested in learning more about tether technologies and applications. It is a comprehensive and up-to-date guide that provides a thorough overview of the field.

History of Tethers in Space

The concept of using tethers in space was first proposed in the early 1960s. However, it was not until the 1980s that tether technology began to mature. In 1984, NASA launched the Tethered Satellite System (TSS-1),which was the first successful tether mission. TSS-1 demonstrated the feasibility of using tethers to generate electricity and to provide artificial gravity.

Since the launch of TSS-1, there have been a number of other tether missions, including the Italian Tethered Satellite System (TSS-2) and the Japanese Tethered Satellite System (TSS-3). These missions have helped to advance the development of tether technology and to demonstrate its potential applications.

Theory of Tether Dynamics

The dynamics of tethers are complex and challenging to understand. However, a number of theoretical models have been developed to describe

the behavior of tethers in space. These models can be used to design and optimize tether systems for a variety of applications.

The most important factors that affect the dynamics of tethers are:

- **Tether length:** The length of the tether affects its natural frequency and its stability.
- **Tether mass:** The mass of the tether affects its inertia and its susceptibility to gravity.
- **Tether stiffness:** The stiffness of the tether affects its ability to withstand loads.
- **Tether damping:** The damping of the tether affects its ability to absorb vibrations.

By understanding the dynamics of tethers, engineers can design and optimize tether systems for a variety of applications.

Design of Tether Systems

The design of tether systems is a complex and challenging task. Engineers must consider a number of factors, including:

- **Tether materials:** The materials used to construct the tether must be strong, lightweight, and durable.
- **Tether structure:** The structure of the tether must be able to withstand the loads that it will be subjected to.
- **Tether deployment system:** The tether deployment system must be able to deploy the tether safely and reliably.

- **Tether control system:** The tether control system must be able to maintain the tether in the desired configuration.

By carefully considering all of these factors, engineers can design tether systems that are safe, reliable, and efficient.

Applications of Tethers in Space

Tethers have a wide range of potential applications in space, including:

- **Spacecraft propulsion:** Tethers can be used to accelerate or decelerate spacecraft without the need for fuel.
- **Station keeping:** Tethers can be used to maintain spacecraft in a desired orbit.
- **Power generation:** Tethers can be used to generate electricity from the Earth's magnetic field.
- **Artificial gravity:** Tethers can be used to create artificial gravity in space.
- **Debris removal:** Tethers can be used to remove debris from orbit.
- **Asteroid mining:** Tethers can be used to transport asteroids to Earth for mining.

The potential applications of tethers in space are vast and varied. As technology continues to develop, tethers are likely to play an increasingly important role in space exploration and exploitation.

The Tethers in Space Handbook Second Edition is a valuable resource for anyone interested in learning more about tether technologies and

applications. It is a comprehensive and up-to-date guide that provides a thorough overview of the field.

Tethers have a wide range of potential applications in space, and they are likely to play an increasingly important role in space exploration and exploitation in the years to come.

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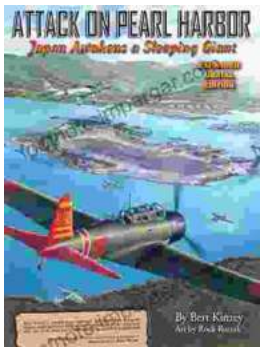

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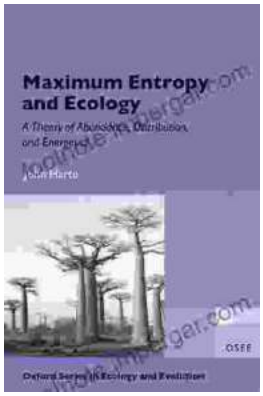

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