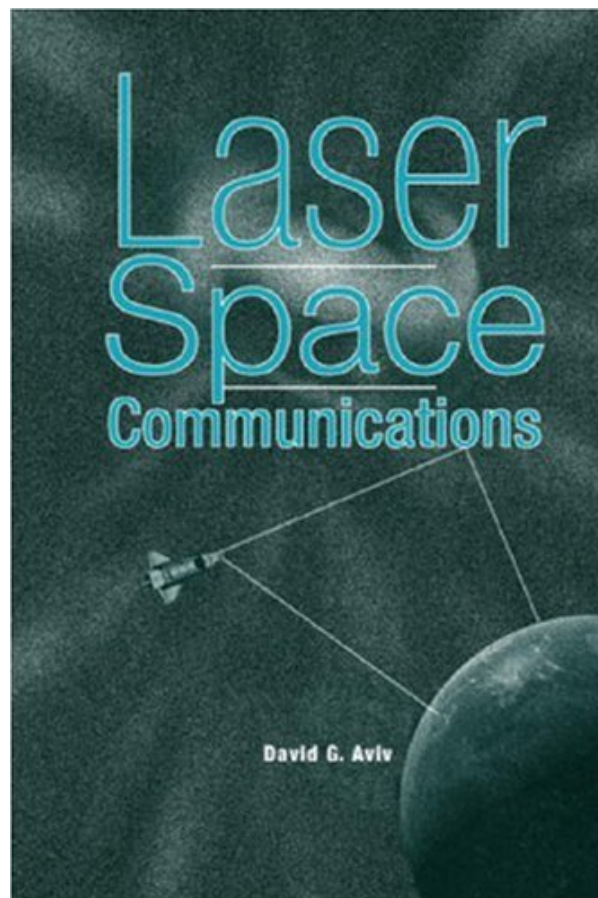
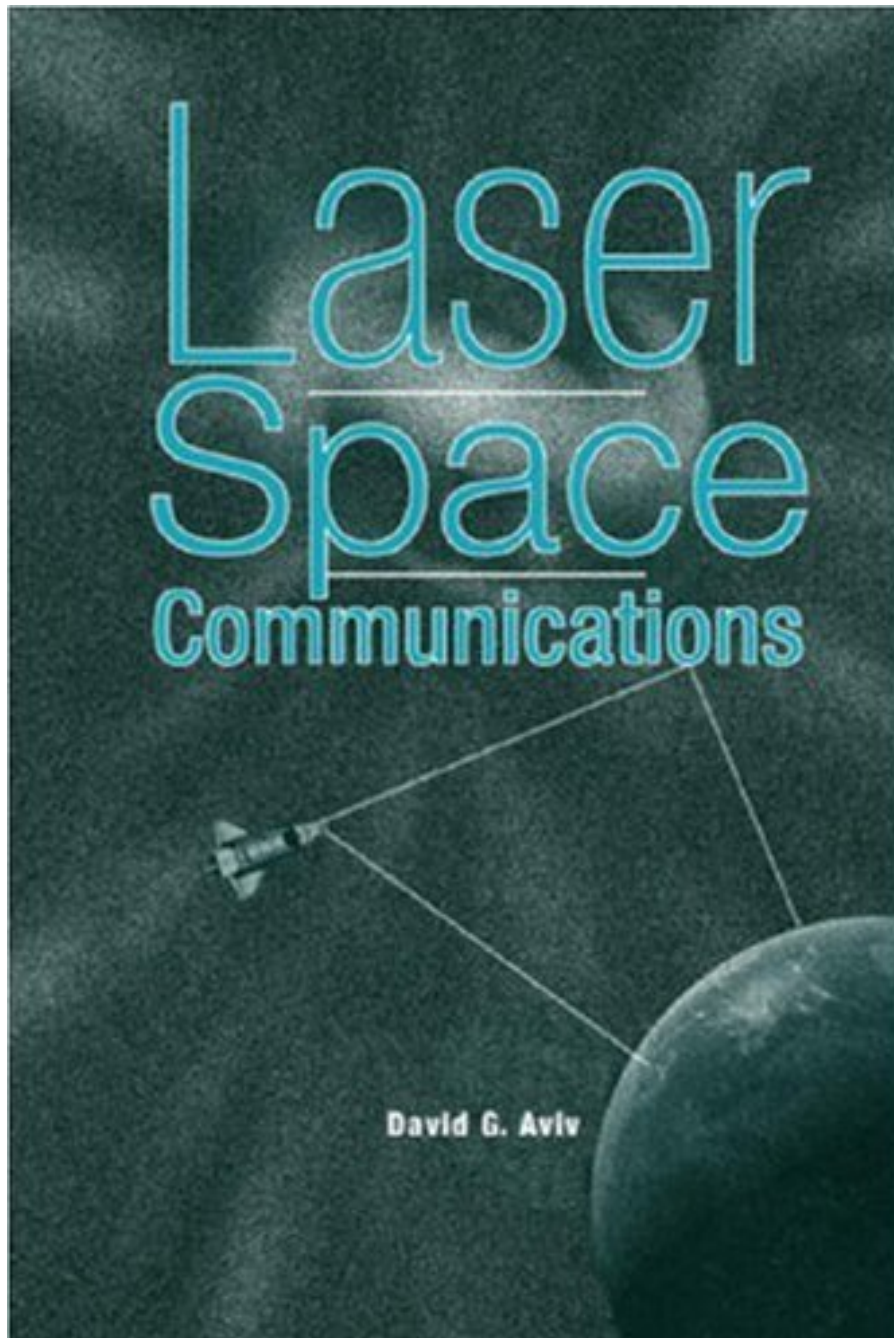


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Review

The book is an excellent reference for systems engineers interested in space optical communications. It provides the needed technical and operational insights to develop and analyze a space based optical communications architecture, estimate its performance and consider alternatives. The author also addresses the potential shortcomings of a laser communications system by suggesting a hybrid approach that includes an RF component. The book also includes some future suggested communications architectures that might be useful to the reader. In summary, I recommend the book to anyone who's interested in understanding optical space based communications. --Dr. George Nacouzi , of the RAND Corporation

About the Author

David G. Aviv is president of ARC, Inc. He has over 25 years of experience in radar and laser communication development as an entrepreneur or lead technologist in small, medium, and large corporations. Mr. Aviv holds an M.S. in electrical engineering/communications and an M.A. in applied mathematics from Columbia University.

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Laser space communications is a hot topic among electrical engineers working for the government and in the defense industry, and this groundbreaking resource is the first to offer professionals a thorough, practical treatment of the subject. The book focuses on the feasibility of laser space communications between satellites, satellites and airborne platforms, and satellites and ground based stations to achieve worldwide connectivity. It covers all the critical topics that engineers working in the field need to understand such as weather avoidance, 5th Generation Internet (5-GENIN), and noise photons. This hands-on volume presents simplified, yet highly accurate, engineering expressions of complex mathematics that save practitioners valuable time and effort when working on their challenging projects.

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By Susi9

The Books always arrive on Time . It is a very good Tool for Researchers

2 of 2 people found the following review helpful.

Intriguing connectivity system elements and architectures

By K. Poehlmann

As a practicing system engineer and analyst for a dozen years at both TRW and the RAND Corporation (ASW, IFF systems, SDI, Space Telescope) I have followed the development of laser technology for a variety of civil and military applications. Lab experiments in the 1970s and '80s faced seemingly insurmountable obstacles to long distance extrapolation. At the time, they were the stuff of science fiction.

Mr. Aviv's laser communications ideas in the late 1990s and early 2000s were unappreciated because they were far ahead of their time. In this excellent book he captures those groundbreaking ideas using clear illustrations, detailed equations, and references to existing, proven platforms. With the advent of Low Earth Orbit satellite systems, robust fiberoptic cables, the advances in wireless digital communication, Internet, and nanotechnology, theoretical satcom architectures suddenly entered the realm of feasibility at the turn of the 21st century.

Experiments like the SILEX system produced encouraging results showing that space communications need no longer be restricted to RF. Rather than propose an either/or solution (laser versus RF), Mr. Aviv has combined the best of both in a compelling set of alternative system architectures that are flexible, mobile, built on a fiber backbone, and incorporate Internet features. Nanosatellites are elements of some of the creative architectures.

The same data compression approach is used for RF as for combined laser/microwave downlinks in poor weather. One of the key drivers to any system architecture is weather-related signal losses, which affect Bit Error Rate (BER) and influence the design of sophisticated adaptive optical subsystems. The author has accounted for these essential elements in each architecture discussed. Specific calculations show how significant reduction in the BER can be achieved under a wide variety of situations, including reducing beam distortion from atmospheric turbulence and jitter.

The presentation of the text is well suited to engineering students as well as seasoned practicing aerospace engineers. Mr. Aviv first gives a very helpful, comprehensive history and background showing the development of assorted laser types. Today's technologies allow fiber lasers rather than diode lasers, to be compatible with fiber link cable transmissions.

The Miniaturized Unmanned Ground-based Mobile (MUGM) system is especially interesting and exciting. The possibilities of the MUGM seem endless for civil (NASA and NOAA), commercial, military, and law enforcement applications. One can easily envision an advanced network allowing IED identification/neutralization, border patrol surveillance, pirate activity monitoring/interdiction, and drug traffic enforcement on land or sea. Transmitting signals via ground-based optical fiber nets as part of a weather avoidance system architecture clearly gives the military an edge in the war on terrorism.

The wideband communication system the author calls Fifth-Generation Internet (5-GENIN) in principle accommodates all of today's systems (including MUGM) and leads the way for new developments through the next decades. Mr. Aviv makes a credible case for this worldwide communication system with connectivity through earth-based Internet systems for spatial and atmospheric laser downlinks and uplinks. No longer the stuff of science fiction!

Although funding for satellite systems and laser research is always in question, Mr. Aviv has anticipated theoretical elements, now in the experimental stage, and described how they could be incorporated into components of existing architectures. He has carefully demonstrated technical feasibility, invaluable to designers of future laser communications systems.

1 of 2 people found the following review helpful.

A Pioneering, Practical New Book

By John Matlock

Lasers offer numerous advantages over microwaves for broadcast point to point communications including lower power, tighter focus/footprint, dramatically increased bandwidth, lighter weight (very important if the equipment is being lifted to space), and no requirement for government frequency assignment. Unfortunately these advantages come with some disadvantages as well, especially in weather penetration if the signal goes from space to the surface of the earth.

This book describes the overall engineering aspects of laser space communications systems. It will enable the engineer to design laser data links in a variety of environments. It is intended for the advanced undergraduate student through the practicing engineer and covers all aspects of laser communications including bandwidths, error rate, privacy aspects, platform stability, adaptive optics, weather avoidance systems and advanced concepts of the Transformational Communication Architecture.

Mr. Aviv has 30+ years of experience in laser communications with various Air Force, NASA, and SDI projects.

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