

High Power Microwaves, Third Edition (Series in Plasma Physics)

By James Benford, John A. Swegle, Edl Schamiloglu

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Following in the footsteps of its popular predecessors, **High Power Microwaves, Third Edition** continues to provide a wide-angle, integrated view of the field of high power microwaves (HPMs). This third edition includes significant updates in every chapter as well as a new chapter on beamless systems that covers nonlinear transmission lines.

Written by an experimentalist, a theorist, and an applied theorist, respectively, the book offers complementary perspectives on different source types. The authors address:

- How HPM relates historically and technically to the conventional microwave field
- The possible applications for HPM and the key criteria that HPM devices have to meet in order to be applied
- How high power sources work, including their performance capabilities and limitations
- The broad fundamental issues to be addressed in the future for a wide variety of source types

The book is accessible to several audiences. Researchers currently in the field

can widen their understanding of HPM. Present or potential users of microwaves will discover the advantages of the dramatically higher power levels that are being made available. Newcomers to the field can pursue further research. Decision makers in direct energy acquisition and related fields, such as radar, communications, and high energy physics, can see how developments in HPM will affect them.

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Editorial Review

Review

"This book's comprehensive coverage of different sources and applications provides an excellent textbook for students as well as a reference for experienced practitioners in the field of high power microwaves."

?Ronald M. Gilgenbach, Department Chair and Collegiate Professor of Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor

"Congratulations to the authors who have kept up with the ever-advancing research in high power microwaves (HPMs). This new edition has expanded chapters pretty much across the board, and the addition of NLTLs to the fold is greatly appreciated. Already a classic in the HPM field, the current edition keeps its high standard and is useful for graduate teaching as well as a general reference for the HPM designer/researcher."

?Dr. Andreas A. Neuber, AT&T Professor ECE and P.W. Horn Professor ECE, Texas Tech University

"I strongly endorse the third edition of **High Power Microwaves** by J. Benford, J. Swegle, and E. Schamiloglu. The first edition of this book appeared in 1992 and the second one in 2007. These books are quite unique in the sense that they combine a reasonably extensive description of high power microwave (HPM) sources (their physical principles, technical accomplishments, and trends) with detailed explanation of various applications of these sources. Special attention is paid to HPM systems and the components that should be added to the sources for systems' reliable and successful operation. This unified, coherent presentation of everything from the fundamentals to the latest developments makes these books extremely useful for everyone working in the field of HPMs. The third edition updates this integrated description of the broad technical area of HPMs to 2015, just filling the gap of the decade after the second edition; the additional material, in particular, describes the increasing activity in Asia. Anyone wishing to educate or update understanding of HPM sources and systems should have this book on the desk."

?Gregory Nusinovich, University of Maryland

"A comprehensive tour-de-force of high power microwave (HPM) physical principles and affiliated technologies. With the updates in this latest edition, it remains accurate in describing historical evolution and the latest and greatest developments in the field. It sets the gold standard for HPM references by meeting both instruction and research resource needs. This must-have book should be the first place to consult (and in many cases that will be enough) to get up to speed on what is known in HPM generation."

?John H. Booske, Vilas Distinguished Achievement Professor, Duane H. and Dorothy M. Bluemke Professor, and Department Chair of Electrical and Computer Engineering, University of Wisconsin–Madison

"Coauthors Benford (president, Microwave Sciences), Swegle (Univ. of New Mexico), and Schamiloglu (consultant, J-Two) are highly qualified researchers who have revised their 2007 second edition with numerous updates to bring it current to 2015 technology (...) The book is thorough, comprehensive, and well organized and covers recent developments worldwide, with many citations to projects in Russia and China. Most chapters require a graduate-level understanding of the subject, although undergraduates may benefit from an introductory chapter on basic microwaves and a helpful, high-power microwave formulary appendix. Abundant references and very few typos make this an essential reference work for anyone seriously interested in this exotic field, which could become more well known in the future if weapons using this technology come into use." --K. D. Stephan, Texas State University

About the Author

James Benford is the president of Microwave Sciences, Inc. He is a fellow of the IEEE and EMP. He has taught 26 courses on high power microwaves in 10 countries. His research interests include high power microwave systems from conceptual designs to hardware, microwave source physics, electromagnetic power beaming for space propulsion, experimental intense particle beams, and plasma physics. He earned a PhD in physics from the University of California, San Diego. Visit jamesbenford.com for more details about his work.

John A. Swegle is a senior advisory scientist at the Savannah River National Laboratory. He is also an independent consultant on high power microwaves. He has conducted short courses or extended workshops on high power microwaves in the United States, Europe, and China. He was an associate editor of *The Physics of Plasmas* and an editor of a special issue of the *IEEE Transactions on Plasma Science*. He earned a PhD and an MS in plasma physics from Cornell University and a BSEE and an MSEE from the University of Washington.

Edl Schamiloglu is a distinguished professor of electrical and computer engineering at the University of New Mexico. A fellow of the IEEE and EMP, he conducts numerous short courses and lectures worldwide and is a recipient of numerous honors, including the IEEE NPSS Richard F. Shea Award and the IEEE NPSS Pulsed Power Science and Technologies' Peter Haas Award. His research interests include high power microwave source development and their effects on networked infrastructure. He earned a BS and an MS from Columbia University and a PhD from Cornell University.

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