



Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series)

By Ben-Zion Maytal, John M. Pfotenhauer

Download now

Read Online ➔

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer

This book is the first in English being entirely dedicated to *Miniature Joule-Thomson Cryocooling*. The category of Joule-Thomson (JT) cryocoolers takes us back to the roots of cryogenics, in 1895, with figures like Linde and Hampson. The "cold finger" of these cryocoolers is compact, lacks moving parts, and sustains a large heat flux extraction at a steady temperature. Potentially, they cool down unbeatably fast. For example, cooling to below 100 K (minus 173 Celsius) might be accomplished within only a few seconds by liquefying argon. A level of about 120 K can be reached almost instantly with krypton. Indeed, the species of coolant plays a central role dictating the size, the intensity and the level of cryocooling. It is the JT effect that drives these cryocoolers and reflects the deviation of the "real" gas from the ideal gas properties. The nine chapters of the book are arranged in five parts.

- **The Common Principle of Cryocoolers** shared across the broad variety of cryocooler types
- **Theoretical Aspects:** the JT effect and its inversion, cooling potential of coolants, the liquefaction process, sizing of heat exchangers, level of pressurization, discharge of pressure vessels
- **Practical Aspects:** modes of operation (fast cooldown, continuous, multi-staging, hybrid cryocoolers), pressure sources, configuration, construction and technologies, flow adjustment, MEMS, open and closed cycle, cooldown process and similarity, transient behavior
- **Mixed Coolant** cryocooling: theory, practice and applications
- **Special Topics:** real gas choked flow rates, gas purity, clog formation, optimal fixed orifice, modeling, cryosurgical devices, warming by the inverse JT effect

The theoretical aspects may be of interest not only to those working with cryocoolers but also for others with a general interest in "real" gas thermodynamics, such as, for example, the inversion of the JT effect in its differential and integral forms, and the exceptional behavior of the quantum gases.

A detailed list of references for each chapter comprises a broad literature survey. It consists of more than 1,200 relevant publications and 450 related patents. The systematically organized content, arranged under a thorough hierarchy of headings, supported by 227 figures and 41 tables, and accompanied by various chronological notes of evolution, enables readers a friendly interaction with the book.

Dr. Ben-Zion Maytal is a Senior Researcher at Rafael-Advanced Defense Systems, Ltd., and an Adjunct Senior Teaching Fellow at the Technion-Israel Institute of Technology, Haifa, Israel.

Prof. John M. Pfotenhauer holds a joint appointment in the Departments of Mechanical Engineering and Engineering Physics at the University of Wisconsin - Madison.

 [Download Miniature Joule-Thomson Cryocooling: Principles an ...pdf](#)

 [Read Online Miniature Joule-Thomson Cryocooling: Principles ...pdf](#)

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series)

By Ben-Zion Maytal, John M. Pfotenhauer

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer

This book is the first in English being entirely dedicated to *Miniature Joule-Thomson Cryocooling*. The category of Joule-Thomson (JT) cryocoolers takes us back to the roots of cryogenics, in 1895, with figures like Linde and Hampson. The "cold finger" of these cryocoolers is compact, lacks moving parts, and sustains a large heat flux extraction at a steady temperature. Potentially, they cool down unbeatably fast. For example, cooling to below 100 K (minus 173 Celsius) might be accomplished within only a few seconds by liquefying argon. A level of about 120 K can be reached almost instantly with krypton. Indeed, the species of coolant plays a central role dictating the size, the intensity and the level of cryocooling. It is the JT effect that drives these cryocoolers and reflects the deviation of the "real" gas from the ideal gas properties. The nine chapters of the book are arranged in five parts.

- **The Common Principle of Cryocoolers** shared across the broad variety of cryocooler types
- **Theoretical Aspects:** the JT effect and its inversion, cooling potential of coolants, the liquefaction process, sizing of heat exchangers, level of pressurization, discharge of pressure vessels
- **Practical Aspects:** modes of operation (fast cooldown, continuous, multi-staging, hybrid cryocoolers), pressure sources, configuration, construction and technologies, flow adjustment, MEMS, open and closed cycle, cooldown process and similarity, transient behavior
- **Mixed Coolant** cryocooling: theory, practice and applications
- **Special Topics:** real gas choked flow rates, gas purity, clog formation, optimal fixed orifice, modeling, cryosurgical devices, warming by the inverse JT effect

The theoretical aspects may be of interest not only to those working with cryocoolers but also for others with a general interest in "real" gas thermodynamics, such as, for example, the inversion of the JT effect in its differential and integral forms, and the exceptional behavior of the quantum gases.

A detailed list of references for each chapter comprises a broad literature survey. It consists of more than 1,200 relevant publications and 450 related patents. The systematically organized content, arranged under a thorough hierarchy of headings, supported by 227 figures and 41 tables, and accompanied by various chronological notes of evolution, enables readers a friendly interaction with the book.

Dr. Ben-Zion Maytal is a Senior Researcher at Rafael-Advanced Defense Systems, Ltd., and an Adjunct Senior Teaching Fellow at the Technion-Israel Institute of Technology, Haifa, Israel.

Prof. John M. Pfotenhauer holds a joint appointment in the Departments of Mechanical Engineering and Engineering Physics at the University of Wisconsin - Madison.

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer Bibliography

- Sales Rank: #3165440 in Books
- Published on: 2012-09-18
- Original language: English
- Number of items: 1
- Dimensions: 11.19" h x 1.09" w x 8.46" l, 2.61 pounds
- Binding: Hardcover
- 382 pages

 [Download Miniature Joule-Thomson Cryocooling: Principles an ...pdf](#)

 [Read Online Miniature Joule-Thomson Cryocooling: Principles ...pdf](#)

Editorial Review

From the Back Cover

This book is the first in English being entirely dedicated to *Miniature Joule-Thomson Cryocooling*. The category of Joule-Thomson (JT) cryocoolers takes us back to the roots of cryogenics, in 1895, with figures like Linde and Hampson. The "cold finger" of these cryocoolers is compact, lacks moving parts, and sustains a large heat flux extraction at a steady temperature. Potentially, they cool down unbeatably fast. For example, cooling to below 100 K (minus 173 Celsius) might be accomplished within only a few seconds by liquefying argon. A level of about 120 K can be reached almost instantly with krypton. Indeed, the species of coolant plays a central role dictating the size, the intensity and the level of cryocooling. It is the JT effect that drives these cryocoolers and reflects the deviation of the "real" gas from the ideal gas properties. The nine chapters of the book are arranged in five parts.

- **The Common Principle of Cryocoolers** shared across the broad variety of cryocooler types
- **Theoretical Aspects:** the JT effect and its inversion, cooling potential of coolants, the liquefaction process, sizing of heat exchangers, level of pressurization, discharge of pressure vessels
- **Practical Aspects:** modes of operation (fast cooldown, continuous, multi-staging, hybrid cryocoolers), pressure sources, configuration, construction and technologies, flow adjustment, MEMS, open and closed cycle, cooldown process and similarity, transient behavior
- **Mixed Coolant** cryocooling: theory, practice and applications
- **Special Topics:** real gas choked flow rates, gas purity, clog formation, optimal fixed orifice, modeling, cryosurgical devices, warming by the inverse JT effect

The theoretical aspects may be of interest not only to those working with cryocoolers but also for others with a general interest in "real" gas thermodynamics, such as, for example, the inversion of the JT effect in its differential and integral forms, and the exceptional behavior of the quantum gases.

A detailed list of references for each chapter comprises a broad literature survey. It consists of more than 1,200 relevant publications and 450 related patents. The systematically organized content, arranged under a thorough hierarchy of headings, supported by 227 figures and 41 tables, and accompanied by various chronological notes of evolution, enables a pleasant reading experience.

Dr. Ben-Zion Maytal is a Senior Researcher at Rafael-Advanced Defense Systems, Ltd., and an Adjunct Senior Teaching Fellow at the Technion-Israel Institute of Technology, Haifa, Israel.

Prof. John M. Pfotenhauer holds a joint appointment in the Departments of Mechanical Engineering and Engineering Physics at the University of Wisconsin - Madison.

Users Review

From reader reviews:

Rita Heil:

What do you consider book? It is just for students since they're still students or the item for all people in the world, the actual best subject for that? Just you can be answered for that problem above. Every person has several personality and hobby per other. Don't to be pressured someone or something that they don't wish do that. You must know how great along with important the book Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series). All type of book is it possible to see on many methods. You can look for the internet sources or other social media.

Angela Heller:

People live in this new day of lifestyle always attempt to and must have the spare time or they will get great deal of stress from both everyday life and work. So , once we ask do people have spare time, we will say absolutely indeed. People is human not a robot. Then we consult again, what kind of activity have you got when the spare time coming to a person of course your answer will certainly unlimited right. Then do you ever try this one, reading publications. It can be your alternative in spending your spare time, often the book you have read is actually Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series).

Arthur Bailey:

Are you kind of busy person, only have 10 or perhaps 15 minute in your morning to upgrading your mind proficiency or thinking skill possibly analytical thinking? Then you are receiving problem with the book in comparison with can satisfy your short time to read it because all of this time you only find reserve that need more time to be study. Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) can be your answer because it can be read by you who have those short extra time problems.

Whitney Ortez:

Many people spending their moment by playing outside using friends, fun activity along with family or just watching TV all day long. You can have new activity to pay your whole day by reading a book. Ugh, ya think reading a book can definitely hard because you have to bring the book everywhere? It ok you can have the e-book, taking everywhere you want in your Touch screen phone. Like Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) which is obtaining the e-book version. So , why not try out this book? Let's see.

Download and Read Online Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph

Series) By Ben-Zion Maytal, John M. Pfotenhauer #1LDB9X4NE6R

Read Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer for online ebook

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer books to read online.

Online Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer ebook PDF download

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer Doc

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer Mobipocket

Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer EPub

1LDB9X4NE6R: Miniature Joule-Thomson Cryocooling: Principles and Practice (International Cryogenics Monograph Series) By Ben-Zion Maytal, John M. Pfotenhauer