



# **SHOCK WAVES IN COLLISIONLESS PLASMAS**

**By DEREK A. THOMAS  
and NICHOLAS A. KRALL**

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# Shock Waves In Collisionless Plasmas

**James M. Witting**



## **Shock Waves In Collisionless Plasmas:**

*Shock Waves in Collisionless Plasmas* Derek A. Tidman, Nicholas A. Krall, 1971      **Physics of Collisionless Shocks** André Balogh, Rudolf A. Treumann, 2013-01-04 The present book provides a contemporary systematic treatment of shock waves in high temperature collisionless plasmas as are encountered in near Earth space and in Astrophysics It consists of two parts Part I develops the complete theory of shocks in dilute hot plasmas under the assumption of absence of collisions among the charged particles when the interaction is mediated solely by the self consistent electromagnetic fields Such shocks are naturally magnetised implying that the magnetic field plays an important role in their evolution and dynamics This part treats subcritical shocks which dissipate flow energy by generating anomalous resistance or viscosity The main emphasis is however on super critical shocks where the anomalous dissipation is insufficient to retard the upstream flow These shocks depending on the direction of the upstream magnetic field are distinguished as quasi perpendicular and quasi parallel shocks which exhibit different behaviours reflecting particles back upstream and generating high electromagnetic wave intensities Particle acceleration and turbulence at such shocks become possible and important Part II treats planetary bow shocks and the famous Heliospheric Termination shock as examples of two applications of the theory developed in part I

*Dissipation Mechanisms in Weak Shock Waves in Collisionless Plasmas* James M. Witting, 1964      *Plasma Physics*, 1971-02-27 Plasma Physics      **Handbook of Shock Waves, Three Volume Set** Gabi Ben-Dor, Ozer Igra, Tov Elperin, 2000-10-18 The Handbook of Shock Waves contains a comprehensive structured coverage of research topics related to shock wave phenomena including shock waves in gases liquids solids and space Shock waves represent an extremely important physical phenomena which appears to be of special practical importance in three major fields compressible flow aerodynamics materials science and astrophysics Shock waves comprise a phenomenon that occurs when pressure builds to force a reaction i e sonic boom that occurs when a jet breaks the speed of sound This Handbook contains experimental theoretical and numerical results which never before appeared under one cover the first handbook of its kind The Handbook of Shock Waves is intended for researchers and engineers active in shock wave related fields Additionally R D establishments applied science research laboratories and scientific and engineering libraries both in universities and government institutions As well as undergraduate and graduate students in fluid mechanics gas dynamics and physics Key Features Ben Dor is known as one of the founders of the field of shock waves Covers a broad spectrum of shock wave research topics Provides a comprehensive description of various shock wave related subjects First handbook ever to include under one separate cover experimental theoretical and numerical results      *Microphysics of Cosmic Plasmas* André Balogh, Andrei Bykov, Peter Cargill, Richard Dendy, Thierry Dudok de Wit, John Raymond, 2014-01-15 Presents a comprehensive review of physical processes in astrophysical plasmas This title presents a review of the detailed aspects of the physical processes that underlie the observed properties structures and dynamics of cosmic plasmas An assessment of the status of understanding of

microscale processes in all astrophysical collisionless plasmas is provided The topics discussed include turbulence in astrophysical and solar system plasmas as a phenomenological description of their dynamic properties on all scales observational theoretical and modelling aspects of collisionless magnetic reconnection the formation and dynamics of shock waves and a review and assessment of microprocesses such as the hierarchy of plasma instabilities non local and non diffusive transport processes and ionisation and radiation processes In addition some of the lessons that have been learned from the extensive existing knowledge of laboratory plasmas as applied to astrophysical problems are also covered This volume is aimed at graduate students and researchers active in the areas of cosmic plasmas and space science Originally published in Space Science Reviews journal Vol 278 2 4 2013      Nuclear Science Abstracts ,1976      **History of Shock Waves, Explosions and Impact** Peter O. K. Krehl,2008-09-24 This unique and encyclopedic reference work describes the evolution of the physics of modern shock wave and detonation from the earlier and classical percussion The history of this complex process is first reviewed in a general survey Subsequently the subject is treated in more detail and the book is richly illustrated in the form of a picture gallery This book is ideal for everyone professionally interested in shock wave phenomena

*Introduction to Plasmas and Plasma Dynamics* Hai-Bin Tang,Thomas M. York,2024-05-09 Introduction to Plasmas and Plasma Dynamics With Plasma Physics Applications to Space Propulsion Magnetic Fusion and Space Physics Second Edition provides an accessible introduction to the understanding of high temperature ionized gases necessary to conduct research and develop applications related to plasmas Thoroughly updated and expanded this sec Describes plasma applications with close reference to elementary processes promoting a deeper understanding of plasmas in new fields Provides structured problems in every chapter that help readers grasp the book s practical lessons Includes a new chapter on numerical methods in plasmas that adds crucial context for experimental approaches      **Scientific and Technical Aerospace Reports** ,1973 Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database      Nuclear Science Abstracts ,1972      **NASA Reference Publication** ,1977      **Fusion Energy Update** ,1980      **Energy Research Abstracts** ,1984

*Plasma Physics Index* ,1982      **New Challenges in Space Plasma Physics: Open Questions and Future Mission Concepts** Luca Sorriso-Valvo,Alessandro Retino,Christopher H. K. Chen,Daniel Verscharen,2023-02-15      **ERDA Energy Research Abstracts** United States. Energy Research and Development Administration,1976-05      *Particle Acceleration Processes, Shockwaves, Nucleosyntheses and Cosmic Rays* COSPAR. Plenary Meeting,1984      ERDA Energy Research Abstracts United States. Energy Research and Development Administration. Technical Information Center,1976

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