

CONTENTS

Chapter 1: ACCELERATOR EXPERIMENTS IN SPACE

| | |
|---|-----|
| The Use of Artificial Electron Beams as Probes of the Distant Magnetosphere..... | 3 |
| J.R. Winckler | |
| Recent Observations of Beam Plasma Interactions in the Ionosphere and a Comparison with Laboratory Studies of the Beam Plasma Discharge..... | 35 |
| W. Bernstein, P.J. Kellogg, S.J. Monson, R.H. Holzworth and B.A. Whalen | |
| Charged Particle Measurements from a Rocket- borne Electron Accelerator Experiment..... | 65 |
| G.R.J. Duprat, A.G. McNamara and B.A. Whalen | |
| On the Use of Artificially Injected Energetic Electrons as Indicators of Magnetospheric Electric Fields Parallel to the Magnetic Lines of Force..... | 75 |
| K. Wilhelm | |
| The French-Soviet Experiments ARAKS: Main Results..... | 87 |
| J. Lavergnat | |
| Wave Excitation in Electron Beam Experiment on Japanese Satellite "JIKIKEN (EXOS-B)"..... | 101 |
| N. Kawashima and Jikiken (EXOS-B) CBE project team | |
| Plasma Waves and Electrical Discharges Stimulated by Beam Operations on a High Altitude Satellite..... | 111 |
| H.C. Koons and H.A. Cohen | |

| | |
|--|-----|
| Plasma Diagnostics by Electron Guns and Electric Field Probes on ISEE-1..... | 121 |
| A. Pedersen | |
| Stimulation of Plasma Waves by Electron Guns on the ISEE-1 Satellite..... | 133 |
| J.P. Lebreton, R. Torbert, R. Anderson and C. Harvey | |
| Evidence for Beam-Stimulated Precipitation of High Energy Electrons..... | 147 |
| E. Bering, J. Benbrook, J. Roeder and W. Sheldon | |
| Highlights of the Observations in the POLAR 5 Electron Accelerator Rocket Experiment.... | 159 |
| B. Grandal | |
| Observations of Plasma Heating Effects in the Ionosphere by a Rocket-borne Electron Accelerator..... | 175 |
| T.A. Jacobsen | |
| Plasma Waves Produced by the Xenon Ion Beam Experiment on the Porcupine Sounding Rocket..... | 199 |
| P.M. Kintner and M.C. Kelley | |
| The EXCEDE SPECTRAL Artificial Auroral Experiment: An Overview..... | 207 |
| R.R. O'Neil, A.T. Stair Jr, W.R. Pendleton and D.A. Burt | |
| Onboard Radiometric Photography of EXCEDE SPECTRAL's Ejected Electron Beam..... | 217 |
| I.L. Kofsky, R.B. Sluder and D.P. Villanucci | |
| General Discussion on Accelerator Experiments in Space..... | 229 |
| Chapter 2: NATURAL BEAM PLASMA INTERACTIONS IN SPACE | |
| Observations of Non-linear Processes in the Ionosphere..... | 235 |
| A.D. Johnstone | |
| Interaction between Natural Particle Beams and Space Plasmas..... | 261 |
| J.E. Maggs | |

Chapter 3: ACCELERATOR EXPERIMENTS IN THE LABORATORY

| | |
|--|-----|
| Laboratory Simulation of Injection of Particle Beams in the Ionosphere..... | 289 |
| P.J. Kellogg, H.R. Anderson, W. Bernstein, T.J. Hallinan, R.W. Holzworth, R.J. Jost, H. Leinbach and E.P. Szuszczewicz | |
| The NASA Space Environment Simulation Laboratory..... | 331 |
| R.J. Jost | |
| Visible Signatures of the Multi-Step Transition to a Beam-Plasma-Discharge..... | 339 |
| T.J. Hallinan, H. Leinbach and W. Bernstein | |
| Electron Energy Distribution Produced by Beam-Plasma-Discharge..... | 351 |
| H.R. Anderson, R.J. Jost, and J. Gordeuk | |
| Time-dependent Plasma Behavior Triggered by a Pulsed Electron Gun under Conditions of Beam-Plasma-Discharge..... | 361 |
| E.P. Szuszczewicz and C.S. Lin | |
| Ignition of the Beam-Plasma-Discharge and its Dependence on Electron Density..... | 371 |
| D.N. Walker, E.P. Szuszczewicz and C.S. Lin | |
| Plasma Waves Stimulated by Electron Beams in the Lab and in the Auroral Ionosphere..... | 381 |
| R.H. Holtzworth, W.B Harbridge and H.C. Koons | |
| Studies of Beam-Plasma Interactions in a Space Simulation Chamber Using Prototype Space-Shuttle Instruments..... | 393 |
| P.M. Banks, W.J. Raitt and W.F. Denig | |
| Transient Effects in Beam-Plasma Interactions in a Space Simulation Chamber Stimulated by a Fast Pulse Electron Gun..... | 405 |
| W.J. Raitt, P.M. Banks, W.F. Denig and H.R. Anderson | |
| Description of the Plasma Diagnostics Package (PDP) for the OSS-1 Shuttle Mission and JSC Plasma Chamber Test in Conjunction with the Fast Pulse Electron Gun (FPEG) ... | 419 |
| S.D. Shawhan | |

| | |
|---|-----|
| Radial Dependence of HF Wave Field Strength in the BPD Column..... | 431 |
| R.J. Jost, H.R. Anderson, W. Bernstein and P.J. Kellogg | |
| Laboratory Beam-Plasma Interactions - Linear and Nonlinear..... | 439 |
| P.J. Christiansen, V.K. Jain and J.W. Bond | |
| Electromagnetic Radiation from Beam-Plasma Instabilities..... | 471 |
| R.L. Stenzel and D.A. Whelan | |
| Electron Beam Injection and Associated Phenomena as Observed in a Large Space Simulation Chamber..... | 481 |
| C. Beghin, Y. Arnal, P. Gille, D. Henry, J.L. Michau, F.X. Sene, J. Lavergnat, J.Y. Delahaye, J.P. Lebreton, A. Gonfalone, F. Malerba, D. Klinge, B. Mæhlum, J. Trøim, and B. Narheim | |
| General Discussion on Accelerator Experiments in the Laboratory..... | 501 |
| Chapter 4: THEORETICAL ASPECTS OF THE BEAM PLASMA INTERACTIONS | |
| Theory of Beam Plasma Discharge..... | 505 |
| K. Papadopoulos | |
| Electron Beam as a Source of Electrostatic Waves..... | 525 |
| J. Lavergnat, D. Le Queau, R. Pellat, A. Roux and A. Saint Marc | |
| Spontaneous Emission of a Charged Particle Beam Inside a Plasma: Coherent and Incoherent Aspects..... | 535 |
| J. Lavergnat and R. Pellat | |
| The Beam-Plasma Discharge under Space-like Conditions..... | 547 |
| S. Cuperman and I. Roth | |

| | |
|---|-----|
| Plasma Waves Generated by Rippled, Magnetically Focused Electron Beams Surrounded by Tenuous Plasmas..... | 559 |
| S. Cuperman and F. Petran | |
| Chapter 5: NEUTRALIZATION OF A CHARGED BODY IN SPACE | |
| Charge Neutralization as Studied Experimentally and Theoretically..... | 573 |
| L.M. Linson | |
| Experimental Studies of the Neutralization of a Charged Vehicle in Space and in the Laboratory in Japan..... | 597 |
| N. Kawashima | |
| Electric Field Observations of Time Constants Related to Charging and Charge Neutralization Processes in the Ionosphere..... | 627 |
| N.C. Maynard, D.S. Evans and J. Trøim | |
| Measurements of Vehicle Potential Using a Mother-Daughter Tethered Rocket..... | 645 |
| P.R. Williamson, W.F. Denig, P.M. Banks, W.J. Raitt, N. Kawashima, K. Hirao, K.I. Oyama and S. Sasaki | |
| General Discussion on Neutralization of a Charged Body in Space..... | 655 |
| Chapter 6: FUTURE PLANS | |
| Space Experiments with Particle Accelerators (SEPAC) | 659 |
| T. Obayashi, N. Kawashima, K. Kuriki, N. Nagatomo, K. Ninomiya, S. Sasaki, A. Ushirokawa, I. Kudo, M. Ejiri, W.T. Roberts, R. Chappell, J. Burch and P. Banks | |
| The Norwegian Program Using Particle Accelerators in Space..... | 673 |
| B.N. Mæhlum | |

| | |
|---|-----|
| The Artificially Injected Charged Particles as a Tool for the Measurement of the Electric Field in the Magnetosphere..... | 677 |
| M. Pirre | |
| General Discussion on Future Experiments..... | 689 |
| Participants..... | 695 |
| Index..... | 701 |

