such experiments on the electrical synthesis and steady-state concentrations of ozone, which gave information on the mechanism of its formation.

Summary:

1) The steady-state concentration of ozone in a circulating system is independent of the current through the ozonizer. It is also independent of the pressure when the latter is high. With decrease in the pressure there is at first a smooth, and then, at relatively low pressures, a sharp fall in the ozone concentration.

2) A mechanism is proposed for the formation and decomposition of ozone, taking into account both bulk and surface processes. The latter are particularly important in the synthesis of ozone at low pressures.

Combustion of Ammonium Perchlorate, L. D. Romodanova and V. I. Roshchupkin, pp. 834–835.

SOVIET PHYSICS—JETP (*Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*). Published by American Institute of Physics, New York

Volume 13, Number 5, November 1961

Certain Problems in Relativistic Gasdynamics of Charged Particles, V. N. Tsytovich, pp. 933–937.

The relativistic motion of a conducting gas is characterized by a number of features, which can lead to effects that are qualitatively different from those found for nonrelativistic motion. For example, Veksler has shown that when an ionized gas mass collides with a concentration of magnetic force lines the ions transfer an appreciable part of their energy to the electrons; the electrons then become relativistic, even if the initial gas velocities are nonrelativistic. At relativistic gas velocities this limiting-current effect becomes still more important. It leads to a situation such that even for negligibly small collision frequencies ν_{eff} between the electrons and ions (i.e., high conductivity), in the reference system attached to a given gas element $\mathbf{E} + \mathbf{v} + \mathbf{H}$ does not vanish and is determined by the inertia force which, in the ultrarelativistic limit, can be large because of the relativistic mass increase. The magnetic field flux through the fluid contour is therefore not conserved and the "freezing" of the magnetic lines of force is disturbed.

Thus, one of the peculiarities of relativistic motion of a conducting gas mass is that the magnetic lines of force may not be frozen. As a result, the description of this motion by equations which contain the two vectors **v** and **H**, the hydrodynamic velocity and the magnetic field (relativistic magnetogasdynamics), is no longer possible. The remark pertains especially to transient processes in which the inertia force in the accompanying reference system may be large.

In order to investigate the relativistic motion of a conducting gas it is convenient to consider relativistic two-component gasdynamics in electromagnetic fields. By virtue of what has been indicated, interest attaches in the relativistic case only to the situation in which the friction of one component against the other is negligibly small compared with the effect of the interaction with the self-consistent field. For this reason, we can consider the equations separately for each of the components in the electromagnetic fields, including in the latter external fields and the fields produced by all the gas components.

The relativistic gasdynamics of a neutral gas have been considered by Khalatnikov. In Sec. 1 of the present work we extend the corresponding results of Khalatnikov to include self-consistent fields and external electromagnetic fields. Despite the fact that the magnetic lines of force may not be frozen for relativistic motion of an electron-ion plasma, it is found that in those cases for which the ion current is small it is possible to extend the theorem of conservation of magnetic flux along a fluid contour.

In problems which are of interest in accelerator technology, for example, the case of a charged electron gas, either the inertia term in the equations of motion is considerably greater than the term that contains the pressure derivatives, or else the external fields have an important effect on the motion. In both cases the characteristic dimensions and the time intervals, which determine the possibility of applying the hydrodynamic analysis, are, to a large extent, determined by the initial and boundary conditions, and by the variations in the external field.

In the present work we consider one-dimensional relativistic breakup of a charged gas layer in vacuum when the inertia term is the principal one. We also consider relativistic collisions between a charged layer and constant external fields. The electric fields produced by breakup of a quasineutral plasma layer in a vacuum are also analyzed.

Racah Method in the Theory of Relativistic Equations, L. A. Shelepin, pp. 963–972.

By using the Racah technique we investigate the group properties of relativistically invariant equations of the type $\alpha\sigma\partial\sigma\psi + \kappa\psi = 0$. The treatment presented is a further development of the work of the author. A consistent procedure is given for finding the commutation relations which completely determine the algebra of the α matrices, by using the technique of j symbols and transformation matrices. As simple examples we give the complete commutation relations for the Duffin-Kemmer equation with spin 1 and for the generalized Pauli-Fierz equation. A classification is given of covariants which form a U (α)-algebra with respect to reflection and charge conjugation. We obtain relations by means of which the infinitesimal matrix I_{ij} is expressed in terms of the α matrices. We discuss the structure of the complete Lagrangian interaction.

Volume 13, Number 6, December 1961

Magnetohydrodynamic Combustion, R. V. Polovin and V. P. Demutskii, pp. 1229–1234.

Possible combustion modes in a magnetohydrodynamic medium are determined. The types of magnetohydrodynamic shock and self-similar waves which can accompany magnetohydrodynamic combustion waves in the presence of a moving perfectly conducting piston are investigated. The piston velocity, the Alfvén velocity, and the reaction energy are assumed to be sufficiently small. The conductivity of the medium is assumed to be infinite.

Singularity in the Schwarzschild Solution of the Gravitation Equations, Yu. A. Rylov, pp. 1235–1236.

Schwarzschild's solution of the gravitational field equations has a singularity at the gravitational radius. It is shown that this singularity can be removed by a suitable choice of coordinate system. Examples of such coordinate systems are given.

Singularities of Cosmological Solutions of Gravitational Equations. III, E. M. Lifshitz, V. V. Sudakov, and I. M. Khalatnikov, pp. 1298–1303.

A general geometric analysis is given of the situation that leads to the appearance of a time singularity in solutions of gravitational equations in a synchronous system of reference [a system satisfying conditions (1)]. This analysis, together with the previous results, leads to the conclusion that such a singularity is absent in the general case of an arbitrary distribution of matter and gravitation field in space.

Volume 14, Number 1, January 1962

Diamagnetic Perturbations in Media Caused by Ionizing Radiation, G. A. Askar'yan, pp. 135–137.

Diamagnetic perturbations in media produced by intense ionizing radiation are studied. It is shown that diamagnetism is produced predominantly by fast electrons. Estimates are given of the perturbation in the magnetic field and of the bursts of radio waves accompanying powerful bursts of ionization. It is noted that these effects can be used for remote dosimetry and for recording bursts of ionization, for the investigation of the behavior of fast electrons in a medium, for the transmission of force to a medium from an inhomogeneous magnetic field, etc.