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Reports by Keyword(s) ■ ALUMINIZED PROPELLANTS

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[High Strength Carbide-Based Fibrous Monolith Materials for Solid Rocket Nozzles](#)

19 FEB 2008 67 pages

Authors: [Jeanette M. Blaine](#); [Mark Patterson](#); [Xiaohong Zhang](#); [Greg Hillmas](#); [Bill Fehrenholtz](#); [ADVANCED CERAMICS RESEARCH TUCSON AZ](#)

Full Text

"Next generation" aluminized propellants have become more energetic in order to impart a higher specific impulse to the system, resulting in higher temperatures and pressures that need to be contained. Nozzles are exposed to temperatures of up to 6100 F (3371 C) during aluminized propellant burn. Additionally, these propellants produce very hostile, abrasive environments; existing materials for boost throat applications have been shown to erode at unacceptable rates, leading to ...

[A Summary of Aluminum Combustion](#)

JAN 2004

Authors: [M. W. Beckstead](#); [BRIGHAM YOUNG UNIV PROVO UT](#)

Abstract

This paper summarizes the characteristics of aluminum combustion, focusing on the burning time of individual particles. The fundamental concepts that control aluminum combustion are discussed, starting with the D(exp n) law. Combustion data from over 10 different sources with almost 400 datum points were cataloged and correlated. Available models also were used to evaluate combustion trends with key environmental parameters. The exponent is shown to be less than two, with ...

[Near-Field Performance Evaluations of Alex Effect in Metallised Explosives](#)

DEC 2003

Authors: [Jing P. Lu](#); [Helen E. Dorsett](#); [Mark D. Franson](#); [Matthew D. Cliff](#); [DEFENCE SCIENCE AND TECHNOLOGY ORGANISATION SALISBURY \(AUSTRALIA\) SYSTEMS SCIENCES LAB](#)

Abstract

Nanomeric aluminium grades such as Alex are known to react more rapidly than conventional aluminium grades in propellant and explosive compositions. To characterise Alex, and evaluate its influence upon near-field performance of explosive formulations, a series of velocity of detonation measurements and plate dent depth tests (detonation pressure) were performed on TNT/RDX/Al, TNT/Inert and Tritonal variants containing CAP45a and Alex. To clarify if the use of Alex reduced the critical ...

[JANNAF Combustion Subcommittee Meeting \(37th\). Volume 1](#)

NOV 2000

Authors: [Ronald S. Fry](#); [Mary T. Gannaway](#); [CHEMICAL PROPULSION INFORMATION AGENCY COLUMBIA MD](#)

Abstract

This volume, the first of two volumes is a compilation of 59 unclassified/unlimited-distribution technical papers presented at the Joint Army-Navy-NASA-Air Force (JANNAF) 37th Combustion Subcommittee (CS) meeting held jointly with the 25th Airbreathing Propulsion Subcommittee (APS), 1 9th Propulsion Systems Hazards Subcommittee (PSHS), and 1st Modeling and Simulation Subcommittee (MSS) meetings. The meeting was held 13-17 November 2000 at the Naval Postgraduate School and Hyatt Regency Hotel, Monterey, California. ...

[JANNAF Combustion Subcommittee Meeting \(36th\). Volume 1 of 3 Held in NASA](#)

[Kennedy Space Center and the DoubleTree Oceanfront Hotel, Cocoa Beach, FL on 18-21 October 1999](#)

Authors: [Ronald S. Fry](#); [Mary T. Gannaway](#); [CHEMICAL PROPULSION INFORMATION AGENCY COLUMBIA MD](#)

Abstract

Volume I, the first of three volumes is a compilation of 47 unclassified/unlimited-distribution technical papers presented at the Joint Army-Navy-NASA-Air Force (JANNAF) 36th Combustion Subcommittee held jointly with the 24th Airbreathing Propulsion Subcommittee and 18th Propulsion Systems Hazards Subcommittee. The meeting was held on 18-21 October 1999 at NASA Kennedy Space Center and The DoubleTree Oceanfront Hotel, Cocoa Beach, Florida. Solid phase propellant combustion topics covered ...

[Reduced Smoke Propellant Binder Residue as a Fuel Source: Feedstock Processing Technology](#)

APR 97 83 pages

Authors: [Kathryn F. Miks](#); [Richard J. Scholze](#); [CONSTRUCTION ENGINEERING RESEARCH LAB \(ARMY\) CHAMPAIGN IL](#)

Full Text

With an estimated 8.8 million lb of reduced smoke propellant targeted for demilitarization, recovery and beneficial reuse of propellant ingredients would reduce or minimize the quantity of waste requiring disposal. Recycling of ammonium perchlorate (AP), the primary propellant ingredient, has been established. Reuse of the AP-depleted binder residue has been studied on a limited basis; however, only aluminized Class 1.3 propellants have been evaluated. This study identifies and evaluates alternate ...

**Burning Characteristics of Individual Aluminum/Aluminum Oxide Particles** 20 JUN 96 49 pagesAuthors: [Eric C. Ruttenberg](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)**Full Text**

An experimental investigation was conducted in which the burning characteristics of individual aluminum/aluminum oxide particles were measured using a windowed combustion bomb at atmospheric pressure and under gravity-fall conditions. A scanning electron microscope (SEM) was used to measure the size distribution of the initial aluminum particles and the aluminum oxide residue. Analysis of the residue indicated that the mass of aluminum oxide contained in particles larger than 12 microns was ...

**The Effects of Particulates on Supersonic Shear Layers and Afterburning in Fuel-Rich Plumes** DEC 95 58 pagesAuthors: [Siwon R. Lee](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)**Full Text**

An investigation was conducted to experimentally quantify the interaction of particulates with the fuel-rich plume flowfield typical for solid propellant rocket motors. This was done in order to optimize enhanced mixing devices or chemical-additive addition for afterburning suppression. Laser sheet flow visualization, sound spectra measurements, plume thermal images and particle size distribution measurements were utilized with reacting and non-reacting gaseous plumes and with the plumes from highly aluminized propellant ...

**Particle Behavior in Solid Propellant Rocket Motors and Plumes** DEC 92 56 pagesAuthors: [John D. McCrorie II](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)**Full Text**

The particle size distribution inside the combustion chamber and the changes that occurred across the exhaust nozzle were measured in a subscale solid propellant rocket motor with a 2% aluminized end-burning propellant grain and a highly underexpanded nozzle. A combination of diagnostic techniques were used. Size distributions in the exhaust plume were determined by a Single Particle Counter, a Malvern 2600 ensemble particle sizer, and by Scanning Electron Microscope (SEM) ...

**Slag and Thermal Environment of a Spinning Rocket Motor** MAY 91Authors: [I-Shih Chang](#); [AEROSPACE CORP EL SEGUNDO CA VEHICLE AND CONTROL SYSTEMS DIV](#)**Abstract**

It has been demonstrated that an increase in radial and/or axial acceleration results in an increase in the amount of slag accumulated in the chamber of a motor with a submerged nozzle design. The slag is composed of aluminum and alumina residue from the combustion of aluminized solid propellants. The presence of slag in the chamber influences motor burnout weight, soak-out thermal environment, residual thrust, and motor performance. An excessive ...

**Diagnostic Measurements on an Aluminized Propellant Plume during Spin and Nonspin Testing** FEB 91 52 pagesAuthors: [K. S. Beale](#); [W. K. McGregor](#); [R. A. Frederick](#); [R. A. Reed](#); [D. W. Roberds](#); [ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AFS TN](#)**Full Text**

Two identical aluminum-loaded solid-propellant rocket motors were tested at simulated altitudes of approximately 100,000 ft. One motor was fired under spin conditions, and the other was static-tested. Plume diagnostic measurements were made during the firings in the infrared to ultraviolet regions of the spectrum. Initial analysis of the data has been performed, and the results are summarized in this report. The data were analyzed with respect to radiant heating, searchlight ...

**Journal of Chinese Society of Astronautics (Selected Articles)** 02 MAY 89Authors: [FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH](#)**Abstract**

Contents: Research on Distribution of Size and Aggregate States of Burning Aluminum Droplets in Propellant Combustion; The Erosive Burning Characteristics of Aluminized Hpb Composite Propellant '87', The Action Mechanism of Lead Compounds in the Combustion Process of Double-Base Propellants. Chinese translations. ANNOTATION: Journal of Chinese Society of Astronautics (Selected Articles)-- Translation.

**Holographic Investigation of Solid Propellant Combustion** DEC 88 56 pagesAuthors: [Albert G. Butler](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)**Full Text**

An investigation into the behavior of aluminized solid propellant combustion in a two-dimensional windowed rocket motor was conducted using holographic techniques. Holograms were recorded in the motor port, aft of the propellant grain and at the entrance to the exhaust nozzle for two different propellant compositions at varying operating pressures. Quantitative particle size data for particles larger than 20 microns were obtained from the holograms. From these data, the mean ...

**Advanced B and Al Iota Combustion Kinetics over Wide Temperature Ranges** 17 DEC 87Authors: [Arthur Fontijn](#); [RENSELAER POLYTECHNIC INST TROY NY](#)**Abstract**

Current ability to improve the combustion efficiency of B and Al solid propellants and slurries is hampered by a lack of understanding and knowledge of the kinetics of the individual reactions involved and the ways and manner by which temperature affects the rate coefficients and product channels. While the simple Arrhenius-type equation  $k(T) = AT(\text{to the } 1/2 \text{ power}) \exp(-E(A)/RT)$  has over limited temperature ranges been of great value, when ...

**An Interactive Computer Code for Preliminary Design of Solid Propellant Rocket Motors** DEC 87Authors: [Chung-I. Yuan](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

An interactive computer code for the preliminary design of solid propellant rocket motors ('SPRMD') was successfully developed and its use was demonstrated through a design example. 'SPRMD' was written in

**Abstract**

FORTRAN for use on an IBM PC/AT. It combined several existing codes ('MICROPEP', 'GRAINS', 'ROCKET', etc.) and used the performance loss estimation methods suggested by the AGARD Propulsion and Energetics Panel for aluminized propellants. Keywords: Solid propellant rocket motor, Design. ...

**Measurements of Particulates in Solid Propellant Rocket Motors**

OCT 87

Authors: [T. D. Edwards](#); [R. K. Harris](#); [K. G. Horton](#); [M. G. Keith](#); [A. Kertadidjaja](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract**

An investigation has been conducted to develop techniques for obtaining quantitative data that can be used to relate solid rocket propellant composition and operating environment to the behavior of solid particulates within the grain port and exhaust nozzle. The techniques employed are high speed motion pictures of propellant strand burners and slab burners in a cross-flow environment, SEM analysis of post-fire residue (strand, slab, and motor), determination of D32 across ...

**A Simulation Study of the Combustion Mechanism of Aluminum in Solid Rocket Propellant at High Temperatures and Pressures in a Shock Tube**

10 SEP 86 12 pages

Authors: [Zichao Liu](#); [FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH](#)

**Full Text**

The study of aluminum combustion in pure oxygen and mixture (N<sub>2</sub>-H<sub>2</sub>- Cl<sub>2</sub>-O<sub>2</sub>) at high temperatures and pressures provides a simulation of combustion mechanism study of aluminum powder in solid rocket propellant. Computations were performed for predicting possible intermediate species and products. Emission spectra of important intermediate species were identified by using a spectrometer. Time histories of the AIO emission band show the continuum radiation of Al<sub>2</sub>O<sub>2</sub> in the reaction scheme. ...

**Holographic Investigation of Metallized Solid Propellant Combustion in a Three-Dimensional Motor**

SEP 86

Authors: [James B. Rubin](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract**

An experimental investigation was performed to determine the feasibility of obtaining particle size data using pulsed-ruby holography in a three-dimensional metallized solid propellant rocket motor. Holograms of a USAF Resolution Target and a LEOS dot target were taken under various conditions, with the system resolution determined to be under 5 microns. Good quality holograms were obtained at pressures of 91, 110, and 280 psi using an HTPB/ ammonium perchlorate propellant ...

**Holographic Investigation of Solid Propellant Combustion in a Three- Dimensional Motor**

DEC 85

Authors: [Sang Chu Yoon](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract**

An investigation was conducted to determine the feasibility of obtaining holographic recordings of particulate behavior during the combustion process of solid propellant in a three-dimensional, windowed rocket motor. Transmittance measurements through the combustion chamber were made in order to select the appropriate neutral density filters which would yield the proper scene beam to reference beam intensity ratio. Holographic recordings were successfully made at combustion chamber pressures up to 185 psia ...

**Crushing Strength of Aluminum Oxide Agglomerates**

JUL 85

Authors: [R. A. Gamble](#); [ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AFS TN](#)

**Abstract**

Aluminum oxide, which is formed during combustion of aluminum-based solid propellants, condenses and solidifies in the exhaust flow to form sub- micron-size particles, which may then adhere together to form agglomerates. Particle sampling, which is required for motor performance or environmental impact investigations, is usually done using a probe placed in the supersonic exhaust flow field. The bow shock at the sample probe inlet will decelerate the gas flow which ...

**Combustion Kinetics of Metal Oxide and Halide Radicals**

04 JAN 85

Authors: [A. Fontijn](#); [RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING](#)

**Abstract**

Experimental measurements on isolated elementary metallic radical oxidation reactions over wide temperature ranges are described. Reactions of importance to advanced propulsion systems are studied. The temperature dependence of the rate coefficients of many of the reactions deviate strongly from the commonly used Arrhenius equation. Therefore, extrapolations, based on this equation, from narrow to wide intervals can not be used. Results for the reaction AlO+C<sub>2</sub> yield AlCO<sub>2</sub>+C<sub>2</sub> from 450-1300K are given. ...

**A Fundamental Study of Liquid Phase Particle Breakup. Revision**

DEC 84 57 pages

Authors: [SPECTRON DEVELOPMENT LABS INC COSTA MESA CA](#)

**Full Text**

Combustion efficiency of aluminized propellants in solid rocket motors is reduced by incomplete aluminum combustion and two-phase nozzle flow losses. Combustion of these propellants can produce large Al/Al<sub>2</sub>O<sub>3</sub> agglomerates. As a direct result of agglomerate breakup, the aluminum combustion rate is increased, and the thermal energy released is more efficiently transferred into exhaust kinetic energy. This research sought to obtain physical data to characterize the mechanisms of aerodynamic droplet breakup. ...

**Comparisons of Solid Propellant Motor Instability Predictions and Motor Firing Experience.**

OCT 1984

Authors: [H. B. Mathes](#); [NAVAL WEAPONS CENTER CHINA LAKE CA](#)

**Abstract**

This paper summarizes experiences at the Naval Weapons Center with solid propellant motor stability prediction and compares the predictions with results of motor firings. Analyses of five different motors are reviewed. Motor types range from a large booster motor which uses an aluminized propellant to a small tactical motor loaded with a

reduced smoke propellant. The paper is organized by motor type with subsections to cover topics such as a ...

**Holographic Investigation of Solid Propellant Combustion in a Two-Dimensional Motor**

SEP 84

Authors: [Y. Lee](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract**

This investigation continued the development of a method for obtaining high quality holograms of the combustion products from metallized solid rocket motor propellants burned in a two-dimensional motor to provide a cross-flow environment. The use of borosilicate side plates as a motor casting allowed good quality holograms to be obtained. With the present two-dimensional motor method there were upper limits of combustion pressure and weight percentage of aluminum where holograms ...

**One-Dimensional Two-Phase Constant Lag Flow in Combustion Chamber of Solid Propellant Rocket Motors**

15 AUG 1984

Authors: [C. Hsien'chi](#); [FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OH](#)

**Abstract**

**An Optical and Mass Spectrometric Study of the Aluminum-Oxygen Flame**

AUG 1984

Authors: [D. P. Weaver](#); [D. M. Mann](#); [AIR FORCE ROCKET PROPULSION LAB EDWARDS AFB CA](#)

**Abstract**

Aluminum oxide particulates are major contributors to aluminized propellant solid rocket stability and two-phase performance losses and are also chief contributors to the visible and infrared exhaust signatures. These particulates result from the combustion of elemental aluminum. A basic research program is being conducted at the Air Force Rocket Propulsion Laboratory (AFRPL) to investigate the formation mechanisms of such particles in a controlled laboratory environment. A high temperature flow reactor ...

**Non-Steady Combustion of Composite Solid Propellants**

MAY 84

Authors: [N. S. Cohen](#); [L. D. Strand](#); [JET PROPULSION LAB PASADENA CA](#)

**Abstract**

Analytical models were developed for the linearized pressure-coupled and velocity-coupled combustion response functions of composite propellants. The theory is that compositional fluctuations occur in the course of composite propellant burning, that these fluctuations originate from the inherent heterogeneity of the propellant microstructure, and that they will contribute to the nonsteady combustion under oscillating pressure (and velocity) conditions. Properties of the response to compositional fluctuations were determined and compared with responses ...

**Low-Cost Insulator**

FEB 1984

Authors: [E. B. Toscano](#); [AIR FORCE ROCKET PROPULSION LAB EDWARDS AFB CA](#)

**Abstract**

Ablative materials protect aerodynamic surfaces, propulsion structures, and ground equipment from the very high temperatures and the velocity of the gases in the exhaust. This paper describes current efforts to evaluate an ablative coating based on a low-cost polymer and a low-cost filler. The objective was to develop a low-cost, ablative/insulating material for routine application to protect costly test facilities. Experiments were conducted at the AFRPL using the standard 15-pound ...

**Determination of the Combustion Mechanisms of Aluminized Propellants**

08 NOV 83

Authors: [J. P. Renie](#); [J. R. Osborn](#); [PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS](#)

**Abstract**

The results are presented from research concerned with determining the mechanisms governing formation and subsequent combustion of metal/ agglomerate particles throughout an aluminized solid rocket motor. Of primary concern is the influence these particles have on propellant combustion characteristics and overall motor performance. The approach taken involves making use of a laboratory scale, servo-controlled strand window bomb in conjunction with both an imaging-type, particle size analyzer and a pulse-lit photographic ...

**JANNAF (Joint Army-Navy-NASA-Air Force) Combustion Meeting Held at Monterey, California, 17-20 October 1983. Volume 1**

OCT 1983

Authors: [D. S. Eggleston](#); [CHEMICAL PROPULSION INFORMATION AGENCY LAUREL MD](#)

**Abstract**

This volume, the first of three volumes, is a collection of 62 unclassified/unlimited papers which were presented at the 20th Joint Army-Navy- NASA-Air Force (JANNAF) Combustion Meeting, October 17-20, 1983, Naval Postgraduate School, Monterey, California. Specific subjects discussed include advanced diagnostic techniques; new burning rate measurement techniques; combustion instability in solid rocket motors and liquid-fueled ramjets; steady- state combustion of composite propellants; metal combustion; interior ballistics of stick and bag ...

**Shock Tube Study of the Ignition and Combustion of Aluminum**

AUG 1983

Authors: [J. F. Driscoll](#); [J. a. Nicholls](#); [V. Patel](#); [B. Khatib-Shahidi](#); [T. C. Liu](#); [MICHIGAN UNIV ANN ARBOR GAS DYNAMICS LABS](#)

**Abstract**

The goal of this project is to obtain data that will help identify the reaction mechanism and the ignition limits of aluminum at elevated temperatures and pressures. Formidable problems arise when attempting such measurements in rocket motors since conditions are unsteady and not easy to control. Therefore, it was decided to mount a pure aluminum sample to the end wall of a shock tube and to ignite the sample using ...

**JANNAF (Joint Army-Navy-NASA-Air Force) Propulsion Meeting (1983), Held at Monterey, California on 14-17 February 1983. Volume II**

FEB 1983

Authors: [Karen L. Strange](#); [CHEMICAL PROPULSION INFORMATION AGENCY LAUREL MD](#)

**Abstract** This volume, the second of five volumes, contains the unclassified, public release papers presented in the strategic ballistic missile, air launched tactical missile, surface/underwater launched tactical missile, airbreathing missile, satellite, and gun propulsion technology sessions of the 1983 JANNAF propulsion Meeting. The meeting was held at The Naval Postgraduate School in Monterey, California, over 14-17 February 1983. Author and source indexes to this volume are included. Indexes to all volumes ...

**Determination of the Combustion Mechanisms of Aluminized Propellants**

27 OCT 1982

Authors: [J. P. Renie](#); [J. R. Osborn](#); [PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS](#)

**Abstract** This research project is concerned with determining the mechanisms governing the formation and combustion of metal/agglomerate/metal oxide particles throughout the solid rocket motor, that is, propellant surface/near surface, motor cavity, and nozzle regions. Also of concern is the influence these particles have on propellant combustion characteristics and overall motor performance. This past year's efforts have been directed toward developing the experimental equipment and/or techniques required for determining particle size distributions ...

**JANNAF Combustion Meeting (19th) Held at NASA Goddard Space Flight Center, Greenbelt, Maryland, 4-7 October 1982. Volume I**

OCT 1982

Authors: [Debra Sue Eggleston](#); [CHEMICAL PROPULSION INFORMATION AGENCY LAUREL MD](#)

**Abstract** This volume, the first of three volumes, is a collection of unclassified/unlimited papers presented at the 19th Joint Army-Navy- NASA-Air Force (JANNAF) Combustion Meeting, held October 4-7, 1982 at the NASA Goddard Space Flight Center, Greenbelt, Maryland. Specific subjects discussed include steady-state combustion of homogeneous and heterogeneous propellants, metal particle combustion, combustion instability in rocket motors, advanced diagnostic techniques, decomposition and combustion of nitramine ingredients and propellants, deflagration-to-detonation transition (DDT), ...

**Determination of the Combustion Mechanisms of Aluminized Propellants**

26 OCT 1981 11 pages

Authors: [J. P. Renie](#); [H. M. Pressley](#); [J. S. Lilley](#); [J. R. Osborn](#); [PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS](#)

**Full Text** This research project is concerned with determining the mechanisms governing the formation and combustion of metal/agglomerate/metal oxide particles throughout the solid rocket motor, that is, surface/near surface, cavity, and nozzle regions. Also of concern is the influence these particles have on propellant combustion characteristics and motor performance. The efforts of this past year were directed toward developing the experimental equipment needed for determining particle size distributions at and near the ...

**JANNAF Combustion Meeting (18th), Held at Pasadena, California, 19-23 October 1981. Volume III**

OCT 1981

Authors: [Debra Sue Eggleston](#); [CHEMICAL PROPULSION INFORMATION AGENCY LAUREL MD](#)

**Abstract** This volume, the third of four volumes, contains the unclassified/ unlimited papers on combustion of solid rocket propellants and on combustion within ramjets. Subjects discussed include acoustics and flow, measurement and analysis of response functions, nonlinear instability, metal combustion, instrumentation and motor behavior, aging and ignition, steady-state combustion, pressure oscillations in small ramjets, solid fuel ramjets, external burning, and liquid fuel ramjets. The volume contains subject, personal author, and corporate ...

**Rocket Research at Georgia Tech.**

NOV 1980

Authors: [E. W. Price](#); [W. C. Strahle](#); [B. T. Zinn](#); [J. E. Hubbartt](#); [R. K. Sigman](#); [GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING](#)

**Abstract** Task I. During the reporting period, the impedance tube setup was utilized in the determination of the admittances of two aluminized solid propellants. Both the pressure coupled response and the gas phase losses have been determined over the frequency range of 400-1200 Hertz. In a separate study, the feasibility of utilizing either quartz or piezoceramic crystals in the direct measurement of the mass loss of burning solid propellants has been ...

**JANNAF Combustion Meeting (17th) Held at Hampton, Virginia, 22-26 September 1980. Volume I.**

NOV 1980

Authors: [Debra Sue Eggleston](#); [JOHNS HOPKINS UNIV LAUREL MD CHEMICAL PROPULSION INFORMATION AGENCY](#)

**Abstract** This volume, the first of four volumes, contains the unclassified/unlimited papers on combustion in solid rocket motors and on combustion in ramjets. Subjects discussed include metal burning, steady-state combustion of composite propellants, velocity coupling and nonlinear instability, vortex shedding and flow effects on combustion instability, combustion instability in solid rocket motors, combustion diagnostics, subsonic and supersonic ramjet combustion, characterization of ramjet flow fields, and injection, ignition, and combustion of ramjet ...

**Sealed-Volume Cartridge.**

07 OCT 1980

Authors: [William P. Peck](#); [DEPARTMENT OF THE NAVY WASHINGTON DC](#)

**Abstract** A gas-generating propellant for use in combination with sealed volume telescoping cartridges yields high pressure for cartridge operation and low residual pressure after cool down. The propellant formulation comprises a high percentage of condensable materials including a binder and an oxidizer and an optional fuel such as light metals and light metal compounds represented by boron, lithium, and lithium aluminum hydride. (Author)

**An Experimental Study of Solid Propellant Deflagration Using High Speed Motion Pictures and Postfire Residue Analysis.**

JUN 1980

Authors: [Vincent Daniel DiLoreto](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract** Six aluminized propellants were investigated through strand burning in a windowed combustion bomb at 500 psi and 1000 psi. Postfire particle residues were analyzed with a scanning electron microscope and found to have bimodal size distributions. The mean diameter of the fine particle distribution was approximately 10 microns in all cases while the mean diameter of the coarse particles was approximately the same size as the initial aluminum cast in ...

**Solid Rocket Motor Technology.**

JUL 1979

Authors: [ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT NEUILLY-SUR-SEINE \(FRANCE\)](#)

**Abstract**

Contents: Session I-Survey Papers; Session II-Ignition, Extinction and Internal Ballistics; Session III-Burn Rate Modelling and Combustion of Metal; Session IV-New Propellants; Session V-Combustion Instability; Session VI-Heat Transfer and Materials; Session VII-Testing and Instrumentation.

**Research on Unsteady Combustion Processes.**

NOV 1978

Authors: [Leonard H. Caveny](#); [Alon Gany](#); [Michael M. Micci](#); [PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING](#)

**Abstract**

Nonsteady propellant combustion and chamber flow behavior, particularly as they relate to combustion stability and aluminized propellant combustion are being studied. The first part of the study is centered around the modulated throat rocket motor which is being developed to investigate the dynamic responses of high performance rocket motors in which externally excited longitudinal pressure and velocity waves produce coupling with propellant combustion processes. Transfer functions between the measured head-end ...

**Significant Early-Time Transient Projectile Acceleration with Concomitant Minimal Pressure Waves.**

NOV 1978

Authors: [C. T. Boyer Jr](#); [NAVAL SURFACE WEAPONS CENTER DAHLGREN LAB VA](#)

**Abstract**

Recent tests have demonstrated that severe early-time transient projectile accelerations can be produced by a propelling charge assembly that generates only minimal traveling pressure waves in the chamber. Five igniter designs consisting of four rapid ignition propagation (RIP) igniters and one standard black powder igniter were tested in the new Navy 8-in. Major-Caliber Lightweight Gun using simulated 8-in. Extended-Range Guided Projectiles. The magnitude of the early-time projectile setback acceleration, when ...

**Method for Improving Metal Combustion in Solid Rocket Propellants.**

12 APR 1977

Authors: [Robert L. Geisler](#); [Arnold M. Crelier](#); [Francisco Q. Roberto](#); [DEPARTMENT OF THE AIR FORCE WASHINGTON D C](#)

**Abstract**

A method for improving the ballistic properties of aluminum powder based rocket propellants by treating the aluminum powder with hydrogen fluoride gas prior to its incorporation into a propellant formulation. (Author)

**A. An Analytical and Experimental Study of the Erosive Burning of Composite Propellants. B. Modeling of Single Particle Aluminum Combustion.**

NOV 1976

Authors: [Merrill K. King](#); [ATLANTIC RESEARCH CORP ALEXANDRIA VA KINETICS AND COMBUSTION GROUP](#)

**Abstract**

Augmentation of solid propellant burning rate often occurs in the presence of strong product gas flow across the burning surface: this phenomenon is referred to as erosive burning. Increasing use of motors with low port-to-throat area ratios (including nozzleless motors) is leading to increased occurrence and severity of erosive burning. A first generation model based upon bending of columnar diffusion flames by a crossflow, permitting prediction of the effect of ...

**Pulsed End-Burning T-Burner.**

29 JAN 1974

Authors: [Edward W. Price](#); [Homer B. Mathes](#); [DEPARTMENT OF THE NAVY WASHINGTON D C](#)

**Abstract**

The patent describes a device which measures the oscillatory combustion response of burning propellants (especially aluminized propellants) to imposition of incident pressure oscillations, and the damping rate of imposed oscillations (primarily due to damping by particles or droplets of condensed phase reaction products). The method uses artificially imposed oscillations to permit measurement of effect of oscillation with propellants that do not spontaneously produce oscillations.

**Fast-Burning Rate/High Slope Propellant Technology Program.**

APR 1971 32 pages

Authors: [R. L. Lou](#); [A. Katsakian](#); [AEROJET-GENERAL CORP SACRAMENTO CA](#)

**Full Text**

This report is on work conducted to advance state-of-the-art with regard to formulation of practical fast-burning and high pressure-exponent propellants. Primary emphasis was directed toward optimization of the processing, mechanical, and ballistic properties. This effort was directed at final tailoring of propellant formulations using functionally modified R-45M polymer. Incorporation of HAA into the formulation containing catocene resulted in an increased pot life. Formulations were scaled up to 10-pound-batch size, and ...

**Explosive Impulse Calculations.**

NOV 1970

Authors: [Michael Gross](#); [PHYSICS INTERNATIONAL CO SAN LEANDRO CA](#)

**Abstract**

The specific impulse of an explosive-plate system was calculated using a one-dimensional hydrodynamic computer code. Parameters affecting the delivered impulse, including charge-to-mass ratio, explosive composition, plate material, and stand-off distance, were varied. Calculations were compared to available experimental data which verified their accuracy. The computed impulse from conventional military explosives was less than 250 seconds. Increased efficiency resulted from the use of a nozzle which produced an impulse of approximately ...

**Role of Aluminum in Suppressing Instability in Solid Propellant Rocket Motors.**

JUL 1968

Authors: [Martin Summerfield](#); [Herman Krier](#); [PRINCETON UNIV NJ DEPT OF AEROSPACE AND MECHANICAL SCIENCES](#)

[Abstract](#)

[LABORATORY STUDIES OF ROCKET PLUME RADIATION AT REDUCED PRESSURE](#)

01-Dec-1961 93 pages

Authors: [J W Sutton](#); [BOEING CO SEATTLE WA](#)

[Full Text](#)

Laboratory studies were conducted about the spatial and spectral distribution of rocket plume radiance at simulated altitudes. Motors of 150 to 200 lb thrust were operated at sea level and at pressures equivalent to approximately 50,000 and 100,000 ft. The propellant combinations studied were gasoline/oxygen, RP 1/OXYGEN, JP 4/oxygen, UDMH/N2O4 and aluminized solid propellant. A traversing rocket technique was employed which permitted simultaneous observation of a number of radiometric and ...

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