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52-320

DGA Intelligence technique et économique

ANGOULEME

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- COMPENDEX PLUS (COPLUS) : Base concernant les sciences de l'ingénieur. Notices en anglais d'articles de périodiques, de communications de congrès, de colloques, etc. Base produite par Elsevier.

- INSPEC : Base relative à l'électricité, l'électronique, l'automatique, l'informatique, la physique, etc. Notices en anglais. Base produite par l'Institution of Electrical Engineers (IEE) du Royaume-Uni.

- NTIS (National Technical Information Service) : Base concernant les rapports de recherche d'organismes contractants du gouvernement américain (DOD, DOE, DARPA, NASA ...). Notices en anglais. Base produite par le ministère du commerce des Etats- Unis.

- AEROCSA (Aerospace Database) : Base concernant l'aéronautique, l'astronautique, le spatial, ainsi que sur les technologies associées. Notices en anglais. Base produite par Cambridge Scientific Abstracts (CSA).

- ENGCSA : Base sur l'ingénierie dans les nouvelles technologies, le génie civil, l'environnement, les séismes, la mécanique et le transport. Notices en anglais. Base produite par Cambridge Scientific Abstracts (CSA).

- MATCSA : Base sur l'industrie de l'aluminium, la céramique, le cuivre, la corrosion, les matériaux techniques, le soudage. Notices en anglais. Base produite par Cambridge Scientific Abstracts (CSA).

- MATERIALS BUSINESS FILE (MATBUS) : Base concernant les aspects financiers et économiques des métaux et des matériaux non métalliques. Notices en anglais. Base produite par Cambridge Scientific Abstracts (CSA).

- METADEX : Base concernant les matériaux et la métallurgie. Notices en anglais. Base produite par Cambridge Scientific Abstracts (CSA)

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(AEROCSA) AH-2018-2167297049

The Influence Factors of Explosion and Shock Resistance Performance of Auxetic Sandwich Defensive Structures

Yang, D.; Zhang, X.; Wu, B.

document en anglais

Effects of different design parameters on auxetic cellular sandwich defensive structure,like thickness,size and Poissons ratio of the honeycombs are studied.The process of a missile impinginon,and penetrating auxetic cellular sandwich structure and the failure mode of the structure under underwater explosion shock are simulated by nonlinear finite element software.Numerical results indicate that structural passive defense has been unable to deal with high speed projectiles.Compared with traditional defensive structures,the auxetic cellular sandwich defensive structure has better anti-shock performance,which will be enhanced by increasing the layers and Poissons ratio of the honeycombs.The structure is more suitable for underwater explosion protectio

Mots clés : Finite element method; Defense programs; Underwater structures; Shock resistance; Sandwich structures; Underwater explosions; Poissons ratio; Failure modes; Explosions; Cellular structure; Design parameters; Honeycombs; Thickness; Projectiles; Underwater; Computer simulation

Journal Article, Shui Chuli Jishu = Technology of Water Treatment ;Zhongguo Haishui Danhua Yu Shui Zailiyong Xuehui, -, Hangzhou, China ;NO. 4; PP. 379-; DP. 01 Jan 2018

State Key Laboratory of Ocean Engineering

(AEROCSA) AH-2018-2168012471

Importance and health hazards of nanoparticles used in the food industry

Bazila Naseer,; Srivastava, G.; Ovais Shafiq Qadri,; Soban Ahmad Faridi,; Rayees Ul Islam,; Kaiser Younis,

document en anglais

Nanoparticles are considered magic bullets because of their unique properties. Nowadays, the use of nanoparticles has emerged in almost every field of science and technology, owing to its potential of revolutionizing specific fields. In the field of food science and technology, the use of nanoparticles is being studied in diverse areas, starting with the harvesting of crops up to final food consumption. With the increased usage of nanoparticles in day-to-day life, concern over their safety has arisen in everyones mind. There is an imbalance between the increase in research to identifnew nanoparticle applications and their safety, and this has triggered pressure on scientists to identify the possible effects of nanoparticles on human health. There are numerous studies on the use of nanotechnology in food and the effect of nanoparticles on human health, but there is a vacuum in the literature in terms of the combined analysis of such studies. This review is an attempt to present and analyze different studies on the use and the safety of nanoparticles in food.

Mots clés : Harvesting; Nanotechnology; Food industry; Harvesting; Nanoparticles; Food; Health hazards; Food consumption; Nanoparticles; Food processing industry; Technology; Food processing; Safety; Harvesting; Safety; Health hazards; Nanotechnology; Food safety; Vacuum; Nanoparticles; Safety; Food; Projectiles; Health risks

Journal Article, Nanotechnology Reviews ;Walter de Gruyter GmbH , Genthiner Str. 13, Berlin, 10785, Germany ;VOL. 7; NO. 6; PP. 623-641; DP. 01 Nov 2018; DOI. 10.1515/ntrev-2018-0076

(AEROCSA) AH-2018-2168882282

Research on Climbing Control Plan and Performance of Turbocharged Solid Propellant Ramjet(TSPR)

Liu, K.; Li, J.; Liu, Y.; Gao, Y.-h.; Gen, Z.

document en anglais

In order to demonstrate that the turbocharged solid propellant ramjet(TSPR)has the ability to accelerate and climb to cruise state independently,and get the suitable ballistic flight plan,the research on the climbing flight plan of TSPR has been carried out. Firstly,the off-design performance of TSPR with two different design points-high altitude cruise condition design point and maximum power design point,has been analyzed by drawing on the parameters of the existing projectiles in the range of ballistic flight. Then compared with the engine thrust and the aircraft drag,it can be concluded that,with the high altitude cruise condition as design point,the thrust provided by the TSPR during climbing was less than the drag of the vehicle,which makes it difficult for TSPR to climb independently.

Nevertheless,when the engine was designed at the maximum power sate and the relative conversion speed was constant,the climb performance of TSPR is excellent,and it is able to accelerate from(3 km,Ma0.9)to(10 km,Ma2.2). Besides,the range of the missile driven by TSPR is three times as long as that of solid rocket,which proves that TSPR has the ability to independently accelerate and climb to cruise state,and has good impulse performance as well.

Mots clés : High altitude; Climb; Superchargers; Product design; Thrust; Solid propellants; Maximum power; Flight plans; Climbing flight; Climbing; Aircraft rockets; Altitude; Projectiles; Drag

Journal Article, Tuijin Jishu = Journal of Propulsion Technology ;China Aerospace Corporation, No.3 Third Research Academy, No.31 Institute, PO Box 7208-26, Beijing, 100074, China ;NO. 3; DP. 01 Jan 2018

Science and Technology on Combustion,Internal Flow and Thermal-Structure Laboratory,Northwestern Polytechnical University

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(AEROCSA) AH-2018-2172133663

Enhanced Quadrupole and Octupole Strength in Doubly Magic ^sup 132^Sn

Rosiak, D.

document en anglais

The first 2+ and 3- states of the doubly magic nucleus 132Sn are populated via safe Coulomb excitation employing the recently commissioned HIE-ISOLDE accelerator at CERN in conjunction with the highly efficient MINIBALL array. The 132Sn ions are accelerated to an energy of 5.49 MeV / nucleon and impinged on a 206Pb target. Deexciting rays from the low-lying excited states of the targetand the projectile are recorded in coincidence with scattered particles. The reduced transition strengths are determined for the transitions 0g.s.+21+, 0g.s.+31-, and 21+31- in 132Sn. The reon these states provide crucial information on cross-shell configurations which are determined within large-scale shell-model and Monte Carlo shell-model calculations as well as from random-phase approximation and relativistic random-phase approximation. The locally enhanced B(E2; 0g.s.+21+) strength is consistent with the microscopic description of the structure of the respective statewithin all theoretical approaches. The presented results of experiment and theory can be considered to be the first direct verification of the sphericity and double magicity of 132Sn.

Mots clés : Mathematical analysis; Quadrupoles; Projectiles; Computer simulation; Lead isotopes; Approximation

Journal Article, Physical Review Letters ;American Physical Society, 1 Physics Ellipse, College Park, 20740-3841, United States ;VOL. 121; NO. 25; PP. 1-; DP. 21 Dec 2018; DOI. 10.1103/PhysRevLett.121.252501

Institut fur Kernphysik, Universitat zu Koln, Zulpicher StraBe 77, D-50937 Koln, Germany

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(AEROCSA) AH-2018-2172135158

Numerical Analysis of Fitness Ratio Influence on Jetting Projectile Charge

Cui, K.; Gao, M.; Mi, S.

document en anglais

In order to study the influence of different fitness ratio of charge on jetting projectile charge, carry out numerical simulation of JPC charge influence. Use simulation software of AUTODYN to establish shaped charge model,carry out numerical simulation of JPC charge process, and analyze the influence principle of fitness ratio on JPC head speed,kinetic energy and explosion utilization ratio. The analysis results show that when the fineness ratio is larger than 1.4, the increase of charge-diameter ratio is little, the JPC head speed and kinetic energy significantly reduced. The results provide the reference for JPC warhead design and application.

Mots clés : Simulation; Mathematical models; Fineness; Current carriers; Fineness ratio; Fitness; Kinetic energy; Projectiles; Numerical analysis; Computer simulation; Charge simulation

Journal Article, Binggong Zidonghua = Ordnance Industry Automation ;Southwest Automation Research Institute, PO Box 207 Mianyang, Sichuan, 621000, China ;NO. 12; PP. 81-; DP. 01 Jan 2018

Department of Missile Engineering, Ordnance Engineering College

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(AEROCSA) AH-2018-2172135218

Influence Analysis of Bullet Shell Material on Projectile Extrusion

Hou, W.; Yang, Z.; Lan, W.; Long, J.

document en anglais

Research on certain type small caliber rifle for studying the effect of projectiles on the extrusion process. The extrusion test of H90 copper beaded and copper-clad steel was taken as an example to analyze the properties of projectile materials, and get the extrusion force change corresponding of different ammunition. Using the finite element simulation model, combined with the test results, the mathematical model of the extrusion process is derived and its correctness is verified. The verification results show that the numerical analysis results and the simulation results agree with the experimental data. Judging from the results of the analysis and calculation, the difference in the material of the bullet shell causes a large difference in the extrusion process.

Mots clés : Finite element method; Simulation; Copper; Mathematical models; Projectiles; Numerical analysis; Computer simulation; Extrusion cladding

Journal Article, Binggong Zidonghua = Ordnance Industry Automation ;Southwest Automation Research Institute, PO Box 207 Mianyang, Sichuan, 621000, China ;NO. 12; PP. 58-; DP. 01 Jan 2018

College of Mechatronics Engineering, North University of China

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(AEROCSA) AH-2019-2167788202

Structural design of a 3-D printed stab resistant body armor

Gong, Z.; Qian, X.; Yuan, M.

document en anglais

Purpose. Stab-resistant body armor (SRBA) can protect the human body from injury as a result of stabbing by sharp projectiles. However, in its current design SRBA, it has not been widely adopted for use, because of its weight and poor flexibility. Herein, this paper aims to detail a new type of SRBA that is inspired by the armor plating of mammals and is fabricated using laser sintering (LS) technology.Design/methodology/approachThis new type of SRBA was fabricated using LS technology. The laser sintered SRBA was subjected to a stab resistance performance test that conformed to the GA 68-2008 Chinese National Standard. The stab resistance response of the novel structured, stab resistance test plates in this study was analyzed using the using the AUTODYN explicit module in ANSYS-Workbench.FindingsThe structure of the novel stab resistance plate was designed and the optimum structural parameters were tested, discussed and achieved. The mechanism of dissipation of the impact energy by the pyramidal structures of the novel SRBA was studied, and it was found that this structure dispersed the kinetic energy of the knife and minimized the structural damage to the plate. Interlinks inspired by the pangolin hierarchy structure were designed and used to fabricate a large piece of laser sintered body armor.Originality/valueHigh-performance laser sintered stab resistance plate was produced via the material and structure studies, which could reduce 40 per cent weight on the stab resistance body armor and increase the wearability.

Mots clés : Mechanical properties; Success; Plates (structural members); Armor; Experiments; Lasers; Armor; Performance tests; Energy dissipation; Technology utilization; Flexibility; Computer simulation; Design; Structural design; Three dimensional printing; Structural damage; Laser sintering; Shear strength; Kinetic energy; Weight; Projectiles; Three dimensional bodies; China

Journal Article, Rapid Prototyping Journal ;Emerald Group Publishing Limited, Howard House, Wagon Lane, Bingley, BD16 1WA, United Kingdom ;VOL. 25; NO. 1; PP. 143-151; DP. 01 Jan 2019; DOI. 10.1108/RPJ-05-2017-0086

School of Mechanical Engineering, Beijing Institute of Technology, Beijing, China

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(AEROCSA) AH-2019-2167933590

Aerodynamic forces on projectiles used in various sports

Shah Kunjal,; Shakya Ravi,; Mittal Sanjay,

document en anglais

The aerodynamics of projectiles used in various sports is investigated via experiments in a low speed wind tunnel. Force measurements are carried out on actual artifacts at speeds in the range of 15-75 m/s. The sports considered include golf, field hockey, soccer, baseball, tennis, cricket, volleyball, and badminton. Both synthetic and duck-feather models of shuttle-cocks used in badminton are considered. The variation of the coefficient of drag, CD, with Reynolds number, Re, is

quite different for the two models. The deformation of the synthetic model increases significantly with an increase in speed, leading to a decrease in CD with an increase in Re. The duck-feather model, on the other hand, does not undergo such severe deformations. Force measurements for a baseball are carried out for three different orientations of its seam with the free-stream flow. Variation of CD with Re for two internationally approved brands of golf balls is presented for the first time in the open literature. The data are compared with those for a ball used in field hockey, which also has dimples on its surface, albeit of different sizes and distributions. Force measurements are carried out on a new cricket ball as well as one whose surface is manually roughened to resemble a ball that has been in play for about 40 overs (=240 deliveries). The study brings out the regimes of conventional- and reverse-swing and their dependence on the surface roughness of the ball. Experiments on balls with differential roughness of the two hemispheres of the ball are utilized to study the contrast-swing. Particle Image Velocimetry measurements are carried out for the 3D-printed model of a new cricket ball to explore the phenomena of conventional- and reverse-swiExperiments on a tennis ball bring out the role of the fuzz in the transition of the boundary layer on its surface; a near-constant CD for the entire range of Re that is studied is observed. The brands of a soccer ball and volleyball that are tested exhibit very similar behaviour. In the supercritical regime, an increase in CD is followed by its decrease with an increase in Re.

Mots clés : Low speed wind tunnels; Artifacts; Aerodynamic forces; Particle image velocimetry; Golf balls; Baseball; Fluid flow; Force measurement; Velocity measurement; Dimpling; Reynolds number; Badminton; Field hockey; Dependence; Hockey; Image contrast; Coefficient of variation; Experiments; Water runoff; Deformation; Three dimensional models; Volleyball; Aerodynamics; Surface roughness; Computational fluid dynamics; Hemispheres; Boundary layer transition; Reynolds number; Projectiles; Low speed

Journal Article, DP. 01 Jan 2019; DOI. 10.1063/1.5064700

(AEROCSA) AH-2019-2168054252

Vista Outdoor Operations LLC; Patent Issued for Pattern Configurable Reticle (USPTO 10,175,031)

document en anglais

Mots clés : Compensation; Inventors; Patents; Ammunition; Firearms; Ballistics; United States--US

News, Journal of Engineering ;NewsRx, Suite 125, 100 City View, 3330 Cumberland Boulevard, ATLANTA, 30339, United States ;PP. 372-; DP. 21 Jan 2019

(AEROCSA) AH-2019-2168244136

Earth and Moon impact flux increased at the end of the Paleozoic

Mazrouei Sara,; Ghent, R. R.; Bottke, W. F.; Parker, A. H.; Gernon, T. M.

document en anglais

Impact rates on Earth and the MoonThe rate at which impacts produce craters on the Moon is used to calibrate ages in planetary science. Earth should also have received similar numbers of impacts, but many craters have been hidden by erosion, ice sheets, and so on. Mazrouei et al. used infrared images of the Moon to estimate the ages of young lunar craters (see the Perspective by Koeberl). They found that the impact rate increased within the past 500 million years, a conclusion strengthened by an analysis of known impact craters on Earth. Crater size distributions are the same oEarth and the Moon over this period, implying that terrestrial erosion affects all craters equally, regardless of their size.Science, this issue p. 253; see also p. 224The terrestrial impact crater record is commonly assumed to be biased, with erosion thought to eliminate older craters, even on stable terrains. Given that the same projectile population strikes Earth and the Moon, terrestrial selection effects can be quantified by using a method to date lunar craters with diameters greater than 10 kilometers and younger than 1 billion years. We found that the impact rate increased by a factor of 2.6 about 290 million years ago. The terrestrial crater record shows similar results, suggesting that the deficit of large terrestrial craters between 300 million and 650 million years ago relative to more recent times stems from a lower impact flux, not preservation bias. The almost complete absence of terrestrial craters older than 650 million years may indicate a massive global-scale erosion event near that time.

Mots clés : Paleozoic; Impact analysis; Infrared imagery; Lunar craters; Erosion; Moon; Terrestrial environments; Erosion; Projectiles; Earth-Moon system; Lunar surface; Ice sheets; Preservation

Journal Article, Science ;The American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington , 20005, United States ;VOL. 363; NO. 6424; PP. 253-257; DP. 18 Jan 2019; DOI. 10.1126/science.aar4058

School of Ocean and Earth Science, University of Southampton, Southampton, UK

(AEROCSA) AH-2019-2168983498

TAPE FOR WIRE HARNESSES

LeDuc, Z.

document en anglais

In a single year, millions of cars are manufactured worldwide. While the styles, parts and features may vary, every vehicle requires a wire harness. The harness connects the wiring throughout the vehicle, powering everything from power steering and headlights to in-dash displays and heated seats. Protecting the wires is crucial to the safety of the vehicle. Wires exposed to high temperatures, erosive chemicals and projectiles will be damaged leading to fires, brake failures and critical malfunctions. To prevent these issues, wires need to be bundled and covered. Tape is another option for bundling and protecting wires. According to Christine Toussaint, product manager at Scapa, tapes are more flexible and cost-effective than other bundling options because they can be used for protective wrapping, bundling and sealing. With a wide variety of backings and adhesives, tape can offer sound dampening, thermal and electrical insulation and abrasion protection of the same quality of the other methods.

Mots clés : Bundling; Wire; Polyesters; Manufacturing; Electrical insulation; Headlights; Fire damage; Malfunctions; Backups; Adhesives; Automotive components; Abrasion resistance; Seats; Automobile industry; Organic chemistry; Brake by wire systems; Adhesive strength; Harnesses; Wire; Product design; Temperature; Power steering; Flexibility; Abrasion; Wiring; Automation; Manufacturers; Heat resistance; Projectiles; Textiles; Electric wire; Phillips, Brent; Europe

Feature, Assembly ;BNP Media, 2401 W. Big Beaver Rd., Suite 700, Troy, 48084, United States ;VOL. 62; NO. 1; PP. 6WP-8WP; DP. 01 Jan 2019

(AEROCSA) AH-2019-2169981745

Numerical simulation of the penetration of granite at wide-range velocities with a new SPH method

Guo-xing, Z.; Hong-fu, Q.; Wang, G.; Quan-zhang, H.; Yuan-qing, Y.

document en anglais

A new Smoothed Particle Hydrodynamics (SPH) method is used to simulate the deformation of granite at large strain and high strain rates during penetration in the study. In order to describe the nonlinear deformation and failure characteristics of rock and metallic materials, Holmquist-Johnson-Cook (HJC) constitutive and damage models were applied to granite plates. In addition, Johnson-Cook (J-C) constitutive model and Gruneisen equation of state were applied to the projectile body, respectively. The projectile body and granite plates were discretized into Lagrangian particles during simulation. Through the simulation of three-dimensional penetration process of granite plates by self-made program at the initial penetration velocity of 04000m/s, this articlcompares and analyzes the penetration results of different projectile bodies, fitting the curve of the penetration depth versus the initial penetration velocity in solid, semi-fluid and fluid penetration fields. The numerical results show the relationship between the penetration depth and the initial penetration velocity in the range of 04000m/s. As the initial penetration velocitincreases, the penetration depth shows an increasing trend in the solid penetration area (V0 | 1421m/s), and a decreasing trend in the semi-fluid penetration area (1421m/s | V0 | 1700m/s). When the initial velocity comes to the range of V0 ü 1700m/s, the penetration is in a complete fluid penetrating state, and the penetration depth increases nonlinearly with the initial penetration velocity. The increasing curve gradually flattens out if V0 ü 3000m/s, and reaches the peak value.

Mots clés : Velocity; Simulation; Smooth particle hydrodynamics; Constitutive relationships; Curve fitting; Penetration depth; Terminal ballistics; Equations of state; Deformation; Fluid flow; Mathematical models; Damage assessment; Plates; Computational fluid dynamics; Granite; Projectiles; Computer simulation

Journal Article, DP. 01 Jan 2019; DOI. 10.1063/1.5058055

(AEROCSA) AH-2019-2170894096

Door protects from projectiles

Anonymous

document en anglais

CornellCookson Inc.'s StormDefender Door is a rolling steel door for safe room protection from tornados and hurricanes. It provides protection from projectiles and wind pressure to 250 psf. The StormDefender Door can be installed right into precast concrete, embedding it into the infrastructure of a building.

Mots clés : Hurricanes; Reinforcing steels; Reinforced concrete; Concrete construction; Tornadoes; Wind pressure; Projectiles; Precast concrete

News, Metal Construction News ;Modern Trade Communications Inc. , 8833 Gross Point Rd., Suite 308 , Skokie, 60077, United States ;VOL. 40; NO. 1; PP. 59-; DP. 01 Jan 2019

(AEROCSA) AH-2019-2172441383

Simulation of induction of color centers in LiF crystals under the action of mid-infrared light bullets

Kuznetsov, A. V.

document en anglais

A simulation of photoionization of LiF crystal with subsequent induction of color centers under the action of mid-infrared light bullet was carried out on the basis of the finite-difference time-domain (FDTD) method. The simulation reproduces earlier observed effect of regular breathing of light bullets in LiF.

Mots clés : Time domain analysis; Simulation; Infrared radiation; Photoionization; Lithium fluoride; Simulation; Projectiles; Finite difference time domain method; Color centers

Conference Proceedings, DP. 29 Jan 2019; DOI. 10.1063/1.5089842

Irkutsk Branch of Institute of Laser Physics, Siberian Branch , Russian Academy of Sciences, 130a, Lermontova Street, 664033, Irkutsk, Russia

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(COPLUS) E2018-4406025442

A Scaling Law for APM2 Bullets and Aluminum Armor Plates

Forrestal M.J.; Lim B.; Chen W.

document en anglais

2018, Society for Experimental Mechanics. In a previous paper, we presented a scaling law for the ballistic-limit velocity for the 7.62mm APM2 bullet and five aluminum alloy plates. This scallaw predicts that the ballistic-limit velocity is proportional to the square root of the product of the plate thickness and a material strength term. In this note, we show that this same scaling law can be used to accurately predict ballistic-limit velocity for the larger 12.7mm APM2 bullet

Mots clés : Aluminum alloys*; Armor; Ballistics; Scaling laws ;Aluminum armor; APM2 bullet; Ballistic limit velocity; Material strength; Plate thickness; Square roots

Journal Article, Experimental Mechanics ;Springer New York LLC ;VOL. 59; NO. 1; PP. 121-123; 5 Ref.; DP. January 2019;

Fort Worth, United States School of Aeronautics and Astronautics, Purdue University

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(COPLUS) E2018-4606054402

The Fire Control Calculation of New Shipborne Gun to Sea Target Based on Terminal Impact Angle Constraint

Wu W.; Wu L.; Lu F. X.

document en anglais

2018 Technical Committee on Control Theory, Chinese Association of Automation. According to the characteristics of the controllable muzzle velocity of projectile launched by new shipbome gun, method of calculating the firing data based on terminal impact angle constraint is proposed. The projectile muzzle velocity is added as a new firing data element of controllable muzzle velocity of shipbome gun, and when striking the sea target in sight, there is a nonlinear

relationship between the hitting probability and projectile muzzle velocity. The model of projectile exterior ballistic and the equation of solving hit problem are established and solved, and according to the terminal impact angle constraint of projectile, the range ofprojectile muzzle velocity is determined. Using the derivative free method, the optimal muzzle velocity of projectile is found. Based on terminal impact angle constraint, and making the maximum hitting probability as optimal conditions, the firing data of the new energy shipbome gun weapon can be calculated effectively.

Mots clés : Fire control systems*; Fire extinguishers; Projectiles; Ships; Velocity ;Derivative-free methods; Fire control; Hitting probabilities; Muzzle velocity; Non-linear relationships; Optimal conditions; Shipborne; Terminal impact angle constraints ;914.2

Conference Proceeding Conference Paper, Chinese Control Conference, CCC; Proceedings of the 37th Chinese Control Conference, CCC 2018 ;IEEE Computer Society ;Academy of Mathematics and Systems Science (AMSS), CAS; China Society for Industrial and Applied Mathematics; et al.; Huazhong University of Science and Technology; Hubei Association of Automation; Wuhan University of Science and Technology ;VOL. 2018-July; PP. 8369-8373; 8 Ref.; DP. October 2018;

37th Chinese Control Conference, CCC 2018 Wuhan, China 2018/07/25-2018/07/27

Weapon Engineering College, Naval University of Engineering, Wuhan, 430033, China Weapon Engineering College, Naval University of Engineering

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(COPLUS) E2018-4606054843

Nonlinear attitude controller design of trajectory correction projectile with fixed-canard based on backstepping sliding mode control

Li K.; Wang L. M.; Fu J.; Gong H. T.

document en anglais

2018 Technical Committee on Control Theory, Chinese Association of Automation. In the current work, a nonlinear mathematic model of the Trajectory Correction Projectile with Fixed-canard iinvestigated. With the nonlinear attitude mathematic model, a backstepping sliding mode attitude controller is designed to keep the desired attitude of the projectile; Lyapunov functions are used to keep the tracking performance when the disturbing torque exists. Simulation results demonstrate the effectiveness and robustness of the proposed control strategy.

Mots clés : Controllers*; Attitude control; Backstepping; Lyapunov functions; Projectiles; Sliding mode control; Trajectories ;Attitude controller; Backstepping sliding mode controls; Control strategies; Mathematic model; Non linear control; Non-linear mathematic model; Tracking performance; Trajectory correction projectiles ;731.1; 731.3; 732.1; 921

Conference Proceeding Conference Paper, Chinese Control Conference, CCC; Proceedings of the 37th Chinese Control Conference, CCC 2018 ;IEEE Computer Society ;Academy of Mathematics and Systems Science (AMSS), CAS; China Society for Industrial and Applied Mathematics; et al.; Huazhong University of Science and Technology; Hubei Association of Automation; Wuhan University of Science and Technology ;VOL. 2018-July; PP. 9809-9814; 13 Ref.; DP. October 2018;

37th Chinese Control Conference, CCC 2018 Wuhan, China 2018/07/25-2018/07/27

School of Energy and Power Engineering, Nanjing University of Sciences and Technology, Nanjing, 210094, China School of Energy and Power Engineering, Nanjing University of Sciences and Technology

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(COPLUS) E2018-4606054960

Optimal Kill Performance of an Oblique Placed Tandem Warhead for Anti-Aircraft High Explosive Projectile

Zhian Z.; Xiaoyun L.

document en anglais

2018 Technical Committee on Control Theory, Chinese Association of Automation. The lethality of the warhead of ordinary anti-aircraft high explosive projectile can be easily influenced by varioufactors, resulting in a large dispersion of fragments and low utilization efficiency of a single projectile. To increase the kill efficiency of an explosive projectile, an oblique placed tandem warhead is presented, namely, two (or more) grains are set in the direction of an offset angle between the axis of warhead and the axis of projectile and the direction of the axis of projectile, respectively, destroying the target with prefabricated fragments and natural fragments. Combined with interception model and damage model of the oblique placed tandem warhead, a mathematical method of calculating kill

probability of a single projectile based on the optimal interception and damaging a definite target is derived. By Monte Carlo method, simulation analysis is done on an improved 122mm projectile with the presented oblique placed tandem warhead in contrast with AHEAD projectile and ordinary 122mm projectile in the aspects of intercept probability and kill probability. Results show that target distance has a significant influence on kill probability; In addition, the impact of velocity of target and protected distance is relatively less.

Mots clés : Projectiles*; Aircraft; Efficiency; Explosives; Monte Carlo methods; Probability ;Damage probability; High-explosive projectiles; Interception models; Kill probability; Mathematical method; Simulation analysis; Tandem warheads; Utilization efficiency ;652.1; 913.1; 922.1; 922.2

Conference Proceeding Conference Paper, Chinese Control Conference, CCC; Proceedings of the 37th Chinese Control Conference, CCC 2018 ;IEEE Computer Society ;Academy of Mathematics and Systems Science (AMSS), CAS; China Society for Industrial and Applied Mathematics; et al.; Huazhong University of Science and Technology; Hubei Association of Automation; Wuhan University of Science and Technology ;VOL. 2018-July; PP. 8512-8518; 21 Ref.; DP. October 2018;

37th Chinese Control Conference, CCC 2018 Wuhan, China 2018/07/25-2018/07/27

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(COPLUS) E2018-4606057881

Modeling for the calculation of interior ballistic velocity of electromagnetic rail launch projectile

Li X.; Lu J.; Feng J.; Zhang X.; Du P.

document en anglais

2018 IEEE. Interior ballistics is of great importance to the study of gun barrels and projectiles. One of its important characteristics is velocity, which determines the firing capability oprojectiles. Aiming at the interior ballistic velocity (IBV) of projectiles launched from electromagnetic (EM) rail, this paper has analyzed the differences in the mechanism between the EM rail gun and the traditional cannon. Based on some assumptions, the calculation formula of projectile EM force was gained with the time-frequency analysis method. Then, it built a simulation calculation model of IBV of the projectile. In addition, the use of the positioned data of the magnetic probe (B-dot probe), to obtain the displacement fitting matrix, leads to the establishment of an experimental fitting model of IBV of the projectile. With the plane EM rail launcher in our laboratory as an example, the above-mentioned two models are applied to analyzing the accelerated motion of the projectile in the chamber. The experimental fitting results are compared with the measured data and simulation results of the B-dot probe, which are basically consistent. Thus, it shows that the IBV's simulation model and the experimental fitting model have high reliability.

Mots clés : Projectiles*; Analytical models; Mathematical models; Probes; Rails; Velocity ;Electromagnetics; Force; Interior ballistic; Magnetic probes; Time frequency analysis

Journal Article, IEEE Transactions on Plasma Science ;Institute of Electrical and Electronics Engineers Inc. ;VOL. 47; NO. 1; PP. 807-813; 15 Ref.; DP. January 2019;

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Review, identification and analysis of local impact of projectile hazards in the LNG industry

Kohout A.; Jain P.; Dick W.

document en anglais

2018 With a strong growth in natural gas production in the United States, a number of liquefied natural gas (LNG) facilities have been proposed and authorized. These LNG facilities havsufficient safety, security, risk assessment and mitigation plans developed in close coordination with the local, state, and federal authorities. However, to continue to ensure safer operations, it is vital to continue to improve the scope of risk assessment strategies. Recent incidents have highlighted the need to consider the potential hazard and risk from projectiles. The main objectives of this study were to-determine projectile parameters such as source, type, and characteristics (mass, diameter, velocity), review methods for local impact analysis, and conduct the analysis for identified potential projectile

hazard scenarios. The paper concludes that the five different calculated impact thicknesses for concrete penetration, concrete scabbing, concrete perforation, and steel penetration and perforation depend directly on the kinetic energy and diameter of the projectile. Furthermore, the authors recommend that operators conduct a projectile hazard analyses for LNG facility projects based on potential projectiles from internal and external accidental events, natural hazards, and intentional events, which would be useful in making recommendations for the thickness and type of storage tanks and other equipment, and for other appropriate mitigation measures.

Mots clés : Risk assessment*; Concretes; Gas fuel purification; Hazards; Kinetic energy; Kinetics; Liquefied natural gas; Natural gas well production; Projectiles; Tanks (military) ;Assessment strategies; Liquefied Natural Gas (LNG); Local impacts; Natural-gas production; Penetration and perforation; Process safety; Projectile hazard; Projectile parameters ;404.1; 412; 512.2.1; 522; 523; 914.1; 931

Journal Article, Journal of Loss Prevention in the Process Industries ;Elsevier Ltd ;PP. 304-319; 45 Ref.; DP. January 2019;

LNG Engineering and Compliance Branch 1, Federal Energy Regulatory Commission, Washington, D.C., United States LNG Engineering and Compliance Branch 1, Federal Energy Regulatory Commission

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(COPLUS) E2019-0306375643

A Dynamic Relation Model Analysis of High-Speed Impact and Sabot Strength

Wu H.; Wang L.; Shang J.; Zhao M.

document en anglais

2017 IEEE. To understand how a projectile penetrates a sabot during a high-speed impact testing, which led to the failure of the impacting experiment, a dynamic model was built based on thinteractions between the projectile and the sabot; and the bearing strengths of the sabot with varying impact speeds were analyzed. The correctness of the model was verified by an experiment. It shows that, with all the other conditions kept the same, the maximum stress between the sabot and the projectile increases with the decrease of the sabot mass, the increase of the projectile and impact speed.

Mots clés : Speed*; Dynamics; Impact testing; Projectiles ;Bearing strengths; Dynamic relation; High speed impact; High speed impact testing; Impact speed; Maximum stress; Relation models; Sabot

Conference Proceeding Conference Paper, 2017 5th International Conference on Mechanical, Automotive and Materials Engineering, CMAME 2017 ;Institute of Electrical and Electronics Engineers Inc. ;PP. 123-127; 14 Ref.; DP. November 2018;

5th International Conference on Mechanical, Automotive and Materials Engineering, CMAME 2017 Guangzhou, China 2017/08/01-2017/08/03

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Projectile impact on fabric-metal assemblies Influence of fabric-metal sequence

Guo Y.B.; Chiang H.J.; Shim V.P.W.; Deng J.J.

document en anglais

2019 Elsevier Ltd Fabrics woven from high-strength fibres are increasingly employed for protection against projectile impact, because of superior mechanical properties. In some applicationshigh-strength fabrics are combined with metallic components to provide sufficient structural rigidity and strength e.g. for vehicle bodies, turbine engine fragment barriers, building doors, etc. An understanding of how the fabric-metal layer sequence affects the resulting ballistic resistance, is essential for effective design of such fabric-metal assemblies. This motivates the current study, whereby multiple plies (1, 2 or 4) of Twaron (T) aramid fabric were combined with an aluminium alloy (A) thin plate to form a lightweight protective panel. The projectile impact penetration resistance of three types of fabric-metal arrangements were examined i) the aluminium alloy plate as the impact face; ii) the Twaron fabric as the impacted layer; iii) the aluminium alloy plate sandwiched between fabric layers. For assemblies with a smaller number of fabric plies (i.e. 1 or 2), siting the aluminium alloy plate as the rearmost layer results in a significantly higher impact energy absorption capacity, compared to having the aluminium alloy plate as the impact face e.g. for (A+1T) assemblies, i.e. Al plate+1 ply of Twaron, 1T/A (impact face layer appears first in this nomenclature) performs much better than A/1T. For (A+2T) assemblies, 2T/A provides the highest impact resistance, A/2T is the weakest, and 1T/A/1T lies in between. However, when the number of fabric plies is increased to 4, a variety of responses was observed. An A/4T configuration absorbs significantly higher energy than a 4T/A arrangement, while a symmetrical 2T/A/2T sequence absorbs less energy than either an A/4T or 4T/A configuration. High-speed optical photography images and post-test specimens were analysed, to examine the deformation and failure

modes of the fabric plies and Al plate in the fabric-metal targets, and how they are affected by the fabric-metal sequence. These help identify the interaction between the fabric plies and Al plate for various fabric-metal sequences, in order to account for the phenomena observed in experiments.

Mots clés : Aramid fibers*; Aluminum plating; Energy absorption; High speed photography; Metals; Plate metal; Plates (structural components); Projectiles ;Arrangement sequence; Ballistic Limit; Impact energy absorption; Metal assemblies; Projectile impact ;408.2; 539.3; 742.1; 819.2

Journal Article, International Journal of Impact Engineering ;Elsevier Ltd ;VOL. 127; PP. 1-16; 28 Ref.; DP. May 2019;

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(COPLUS) E2019-0306381003

Ballistic resistance modeling of aramid fabric with surface treatment

Dolganina N.Y.; Ignatova A.V.; Shabley A.A.; Sapozhnikov S.B.

document en anglais

2019, Springer Nature Switzerland AG. The minimization of mass and reducing the value of deflection of the back surface of an armored panel, which will lower the level of trauma to the humabody, are crucial tasks in the current development of body armors. A significant part of the bullet energy is dissipated due to the friction of pulling-out yarns from ballistic fabrics in the body armor. We present a method for controlling the process of dry friction between yarns surface treatment with various compositions (PVA suspension, rosin). This procedure causes only a slight increase weighting of the fabric. We investigated an impact loading of aramid fabrics of plain weave P110 with different types of surface treatment and without it (the samples were located on the backing material technical plasticine). The indenter speed was in the range of 100130 m/s. We also developed a model of an impact loading of considered samples in explicit FE code LS-DYNA. The surface treatment of the fabric in the model was taken into account by only one parameter the coefficient of dry friction. We considered several methods of the task parallelizing. Numerical experiments were conducted to study the problem scalability. We found that the surface treatment reduces deflection of fabric up to 37% with an increase in weight up to 5.1%. The numerical values of the depths of the dents in the technical plasticine are in good agreement with the experimental data.

Mots clés : Surface treatment*; Armor; Ballistics; Friction; Supercomputers; Weaving; Yarn ;Aramid fabrics; FEA modeling; Frictional coefficients; Impact; LS-DYNA; Plasticine ;404.1; 722.4; 819.4; 819.5

Book Series Conference Paper, Communications in Computer and Information Science; Supercomputing - 4th Russian Supercomputing Days, RuSCDays 2018, Revised Selected Papers ;Springer Verlag ;VOL. 965; PP. 185-194; 30 Ref.; DP. January 2019;

4th Russian Supercomputing Days Conference, RuSCDays 2018 Moscow, Russian Federation 2018/09/24-2018/09/25

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(COPLUS) E2019-0306384788

Numerical study on the multiphase flow characteristics of gas curtain launch for underwater gun

Zhang X.; Yu Y.; Zhou L.

document en anglais

2019 Elsevier Ltd A new launching method which can reduce the water resistance in the barrel and realize continuous launching by forming gas curtain without any complex device is proposed founderwater gun. A simulation-experimental platform is set up for the underwater gas-curtain launch. Based on the theory of gas jets in water and interior ballistics, a mathematical physical model for underwater gas curtain launch is established to predict the launching process of the underwater gun. The calculation results show that when the gun is launched in air and underwater, the muzzle velocity of the gas curtain launch reaches 90.9% of that launched in air under the conditions that the maximum pressure is equivalent. However, the muzzle velocity of underwater full-submerged launch is only 66.7% of that launched in air. The gas curtain can be effectively formed with the center nozzle, providing a gas path for the interior ballistics motion of the projectile. During the formation and expansion process of the gas curtain, the projectile head pressure fluctuates between 3 MPa and 6 MPa before the projectile starts to move. It can be seen that the underwater gas curtain launch can effectively form the gas curtain and realize the underwater low-resistance launch, gaining interior ballistics performance comparable to that of air launch. Compared with the conventional underwater full-submerged launch, underwater gas curtain launch

can achieve preferable interior ballistics performance.

Mots clés : Gases*; Air; Launching; Multiphase flow; Numerical analysis; Projectiles; Underwater ballistics ;Calculation results; Expansion process; Experimental platform; Flow charac-teristics; Gas jet; Interior ballistic; Mathematical physical model; Water-resistances ;631.1; 804; 921.6; 931

Journal Article, International Journal of Heat and Mass Transfer ;Elsevier Ltd ;PP. 250-261; 24 Ref.; DP. May 2019;

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The failure and fracture modes of 35CrMnSi steel projectile with simulated charge penetrating rock at about 1000m/s

Sun Q.; Sun Y.; Li R.; Deng G.; Hu J.

document en anglais

2019 Elsevier Ltd To reveal the projectile failure and fracture modes during high-velocity impact, projectiles made of 35CrMnSi with the same shape but different shell thickness are designed anthen the experiments of penetrating high-strength rock target at about 1000 m/s are carried out. The experimental results indicate that all projectiles are completely fractured with petal shaped fragments produced and fail to effectively penetrate the rock target while only the target surface is comminuted. Besides the discussion on projectile material strength failure based on experimental results, projectile structure damage in the form of dynamic plastic buckling failure is also applied and gives a satisfactory explanation for the fracture pattern of petal shaped fragments with three-hinges structures employed. In addition, by taking the failure model of Mott stochastic distribution into account for the projectiles, numerical simulations are carried out to analyze the projectile fracture modes by Autodyn-3D with different discrete forms and exhibit high credibility. Furthermore, the influences of the filling and different impact conditions including velocities, angles of attack (AOA) and incidence angles on the projectile fracture modes are discussed. In general, the experimental results and the adopted numerical method with high credibility are able to reveal the effect of projectile structure damage on fracture modes and can be referred to further study on the projectile fracture during high-velocity penetration.

Mots clés : Projectiles*; Angle of attack; Chromium alloys; Fracture; Manganese alloys; Numerical analysis; Numerical methods; Silicon alloys; Stochastic models; Stochastic systems; Velocity ;Failure distributions; Fracture mechanisms; High velocity; High-velocity impact; Material strength; Petal shaped fragments; Projectile structures; Stochastic distribution ;543.1; 543.2; 549.3; 651.1; 921.6; 922.1; 951; 961

Journal Article, Engineering Failure Analysis ;Elsevier Ltd ;VOL. 97; PP. 617-634; 41 Ref.; DP. March 2019;

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Penetration resistance of hybrid-fiber-reinforced high-strength concrete under projectile multi-impact

Feng J.; Liang J.; Gao X.; Li J.; He Q.; Dong H.; Sun W.

document en anglais

2019 Elsevier Ltd In this paper, the penetration resistance potential of hybrid-fiber-reinforced high-strength concrete (HFRHSC) is investigated at fiber content of 2%. 12 batches of HFRHSmaterials with various hybridizations were manufactured for comparative analyses of hybridization. The uniaxial compression tests were conducted to determine the 7-day and 28-day compressive strength indicating that the steel fiber outperforms the polypropylene fiber and polyvinyl alcohol fiber in improving compressive strength. The sequent multi-impact penetration tests for each mixture HFRHSC target were carried out with projectile impact locations in equilateral triangle shape whereas the penetration response was evaluated in terms of depth of penetration (DOP) and crater area. The experimental results indicate that the penetration resistance improvement potential of steel fiber reinforced concrete goes moderately ahead of that of the polypropylene or polyvinyl alcohol fiber reinforced concrete. Besides, the DOP caused by multi-impact implies the penetration resistance is remarkably decayed by the first impact while the second penetration poses much less deterioration. Moreover, cavity expansion analysis together with impact damage were applied to the DOP analytical model for HFRHSC multi-impact penetration whereby the target resistance term corresponding each impact was achieved via best fitting. The accumulated damage is also found to be dependent on the hybridization.

Mots clés : Reinforced concrete*; Compression testing; Compressive strength; Deterioration; Fiber reinforced materials; Hardness; High performance concrete; Polypropylenes; Polyvinyl alcohols; Projectiles; Reinforced plastics; Steel fibers ;Damage accumulation; Depth of penetration; Hybrid fiber-reinforced concrete; Hybridization effects; Multi-impact ;412; 815.1.1; 817.1; 819.4; 951

Journal Article, Construction and Building Materials ;Elsevier Ltd ;VOL. 202; PP. 341-352; 55 Ref.; DP. March 2019;

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Aerodynamic forces on projectiles used in various sports

Shah K.; Shakya R.; Mittal S.

document en anglais

2019 Author(s). The aerodynamics of projectiles used in various sports is investigated via experiments in a low speed wind tunnel. Force measurements are carried out on actual artifacts at speedin the range of 15-75 m/s. The sports considered include golf, field hockey, soccer, baseball, tennis, cricket, volleyball, and badminton. Both synthetic and duck-feather models of shuttle-cocks used in badminton are considered. The variation of the coefficient of drag, CD, with Reynolds number, Re, is quite different for the two models. The deformation of the synthetic model increases significantly with an increase in speed, leading to a decrease in CD with an increase in Re. The duck-feather model, on the other hand, does not undergo such severe deformations. Force measurements for a baseball are carried out for three different orientations of its seam with the free-stream flow. Variation of CD with Re for two internationally approved brands of golf balls is presented for the first time in the open literature. The data are compared with those for a ball used in field hockey, which also has dimples on its surface, albeit of different sizes and distributions. Force measurements are carried out on a new cricket ball as well as one whose surface is manually roughened to resemble a ball that has been in play for about 40 overs (=240 deliveries). The study brings out the regimes of conventional- and reverse-swing and their dependence on the surface roughness of the ball. Experiments on balls with differential roughness of the two hemispheres of the ball are utilized to study the "contrast-swing." Particle Image Velocimetry measurements are carried out for the 3D-printed model of a new cricket ball to explore the phenomena of conventional- and reverse-swing. Experiments on a tennis ball bring out the role of the fuzz in the transition of the boundary layer on its surface; a near-constant CD for the entire range of Re that is studied is observed. The brands of a soccer ball and volleyball that are tested exhibit very similar behaviour. In the supercritical regime, an increase in CD is followed by its decrease with an increase in Re.

Mots clés : Sports*; 3D printers; Aerodynamics; Boundary layers; Deformation; Force measurement; Projectiles; Reynolds number; Sporting goods; Stream flow; Surface roughness; Velocity measurement; Wind tunnels ;Aerodynamic forces; Coefficient of drag; Free-stream flow; Low-speed wind tunnel; Particle image velocimetry measurement; Severe Deformation; Supercritical regime; Synthetic models ;461.3; 631.1; 651.1; 651.2; 745.1.1; 931.2; 943.2; 943.3

Journal Article, Physics of Fluids ;American Institute of Physics Inc. ;VOL. 31; NO. 1; 48 Ref.; DP. January 2019;

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(COPLUS) E2019-0406406870

Failure Mechanisms of Ti-Al3Ti metal-Intermetallic Laminate Composites Under High-Speed Impact

Fan X.; Yuan M.; Qin Q.

document en anglais

2018, Science Press. All right reserved./Copyright 2018, Northwest Institute for Nonferrous Metal Research. Published by Elsevier BV. All rights reserved. The penetration process of Ti-Almetal-intermetallic laminate composites impacted by a projectile was numerically investigated. The ballistic performance, stress distribution, failure and energy absorbing mechanisms of Ti-Al3Ti metal-intermetallic laminate composites under high-speed impact were examined in detail. The results show that Ti-Al3Ti metal-intermetallic laminate composites under high-speed impact is mostly under tensile stress, since the compressive wave is reflected back as a tensile wave. During projectile penetration, transverse, inclined, and vertical cracks are formed in the Al3Ti phase, which can dramatically absorb the kinetic energy of projectile.

Mots clés : Failure (mechanical)*; Aluminum alloys; Binary alloys; Computer system recovery; Finite element method; Intermetallics; Kinetic energy; Kinetics; Laminated composites; Metals; Projectiles; Ternary alloys; Titanium alloys ;Ballistic performance; Failure mechanism; High speed impact; Metal intermetallic laminate composites; Penetration process; Projectile penetration; Tensile wave; Vertical crack ;531.1; 541.2; 542.3; 921.6; 931

Journal Article, Xiyou Jinshu Cailiao Yu Gongcheng/Rare Metal Materials and Engineering ;Rare Metals Materials and Engineering Press ;VOL. 47; NO. 9; PP. 2615-2620; 22 Ref.; DP. September 2018;

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Nombre de notices :28