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Department of Defense Authorization for Appropriations for Fiscal Year 1983
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Report of the Committee on National Security, House of Representatives, on H.R. 1119 Together with Additional and Dissenting Views (including Cost Estimate of the Congressional Budget Office).
The Next Arms Race
Naval Research Reviews
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Anti-personnel Weapons
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Laser Technology--development and Applications Springer
The free electron laser (FEL) is among the latest technologies of interest to the U.S. military, in particular, the Navy. In naval applications, FEL laser would serve as a self-defense weapon system, protecting the ship from an array of threats including anti-surface cruise missiles and small boats. This system's potential range and deep magazine makes it ideal as point defense against incoming missiles. Its inexpensive cost of only a few dollars per engagement and multi-mission capability makes this future weapon system superior to the short-range missile-defense systems employed today. The most powerful FEL is currently located in Jefferson Lab, operating at 10 kW, two orders of magnitude short of the 1 MW power level required for weapons application. This thesis will describe the components and theory of operation of the FEL, as well as analyze two competing designs for the next step in the evolution of the future weapon system, the 100 kW FEL, proposed by Brookhaven and Los Alamos National Labs. Due to advances in NPS simulation techniques for the amplifier configuration, a more in depth analysis including the effects of electron beam tilt and shift is performed for the first time on these proposed designs.
War at the Speed of Light Nova Science Pub Incorporated
This book presents a scientific assessment of free-electron-laser technology for naval applications. The charge from the Office of Naval Research was to assess whether the desired performance capabilities are achievable or whether fundamental limitations will prevent them from being realized. The present study identifies the highest-priority scientific and technical issues that must be resolved along the development path to achieve a megawatt-class free-electron laser. In accordance with the charge, the committee considered (and briefly describes) trade-offs between free-electron lasers and other types of lasers and weapon systems to show the advantages free-electron lasers offer over other types of systems for naval applications as well as their drawbacks. The primary advantages of free-electron lasers are associated with their energy delivery at the speed of light, selectable wavelength, and all-electric nature, while the trade-offs for free-electron lasers are their size, complexity, and relative robustness. Also, Despite the significant technical progress made in the development of high-average-power free-electron lasers, difficult technical challenges remain to be addressed in order to advance from present capability

to megawatt-class power levels.
Scientific Assessment of High-Power Free-Electron Laser Technology DIANE Publishing
This report prepared for members of Congress and staff provides credible, current insight into the status of exotic weapons being developed for the US Navy, weapons which might be decisive in the event of a shooting war.Three new ship-based weapons being developed by the Navy-solid state lasers (SSLs), the electromagnetic railgun (EMRG), and the gun-launched guided projectile (GLGP), also known as the hypervelocity projectile (HVP)-could substantially improve the ability of Navy surface ships to defend themselves against surface craft, unmanned aerial vehicles (UAVs), and eventually anti- ship cruise missiles (ASCMs).In addition to the question of whether to approve, reject, or modify the Navy's FY2021 funding requests for SSLs, EMRG, and HVP/GLGP, issues for Congress include the following: -whether the Navy is moving too quickly, too slowly, or at about the right speed in its efforts to develop these weapons;-the Navy's plans for transitioning these weapons from development to procurement and fielding of production models aboard Navy ships; and-whether Navy the Navy's shipbuilding plans include ships with appropriate amounts of space, weight, electrical power, and cooling capacity to accommodate these weapons
Directed-Energy Weapons and the Future of Twenty-First-Century Warfare Springer
At the request of the Chief of Naval Operations, the National Research Council, under the auspices of the Naval Studies Board, established a committee to assess the Department of the Navy's current and future naval theater missile defense (TMD) capabilities. The Committee for Naval Forces' Capability for Theater Missile Defense first convened in April 2000 and met approximately 2 days a month for 8 months. This report is based on the information presented to the committee during that period and on the committee members' accumulated experience and expertise in military operations, systems, and technologies.
Hearings Before the Subcommittee on Science, Technology and Space of the Committee on Commerce, Science, and Transportation, United States Senate, Ninety-sixth Congress, First and Second Sessions .... ABC-CLIO
This handbook examines the militarization of space, providing a fair and balanced discussion of the emerging issues concerning space security and defense. * Excerpts from key documents * A chronology * Select glossary of terms * Illustrations * Sidebars with additional detail
The Dawn of a New Military Age DIANE Publishing
The Navy is currently developing three potential new weapons that could improve the ability of its surface ships to defend themselves against enemy missiles-solid state lasers (SSLs), the electromagnetic railgun (EMRG), and the hypervelocity projectile (HVP). Any one of these new weapon technologies, if successfully developed and deployed, might be regarded as a "game changer" for defending Navy surface ships against enemy missiles. If two or three of them are successfully developed and deployed, the result might be considered not just a game changer, but a revolution. Rarely has the Navy had so many potential new types of surface-ship missile-defense weapons simultaneously available for development and potential

deployment. The HPV in particular has emerged as a program of particular interest to the Department of Defense (DOD), which is exploring the potential for using the weapon across multiple U.S. military services. Although the Navy in recent years has made considerable progress in developing SSLs, EMRG, and HVP, a number of significant development challenges remain. Overcoming these challenges will likely require years of additional development work, and ultimate success in overcoming them is not guaranteed. The issue for Congress is whether to approve, reject, or modify the Navy's funding requests and proposed acquisition strategies for these three potential new weapons. Potential questions include: Using currently available approaches for countering anti-ship cruise missiles (ASCMs) and anti-ship ballistic missiles (ASBMs), how well could Navy surface ships defend themselves in a combat scenario against an adversary such as China that has large numbers of ASCMs (including advanced models) and ASBMs? How would this change if Navy surface ships in coming years were equipped with SSLs, EMRG, HVP, or some combination of these systems? How significant are the remaining development challenges for SSLs, EMRG, and HVP? Are current schedules for developing SSLs, EMRG, and HVP appropriate in relation to remaining development challenges and projected improvements in enemy ASCMs and ASBMs? To what degree are current schedules for developing SSLs, EMRG, or HVP sensitive to annual funding levels? When does the Navy anticipate issuing roadmaps detailing its plans for procuring and installing production versions of SSLs, EMRGs, and HVP on specific Navy ships by specific dates? Will the kinds of surface ships that the Navy plans to procure in coming years have sufficient space, weight, electrical power, and cooling capability to take full advantage of SSLs (particularly those with beam powers above 200 kW) and EMRG? What changes, if any, would need to be made in Navy plans for procuring large surface combatants (i.e., destroyers and cruisers) or other Navy ships to take full advantage of SSLs and EMRG? Are the funding sources for SSLs, EMRG, and HVP in Navy and Defense-Wide research and development accounts sufficiently visible for supporting congressional oversight?

Laser Research and Applications

Società Editrice Esculapio

It is imperative the United States (US) accelerate its development within the field of directed energy weapons and guard against the emergence of hypersonic threats. Hypersonic weaponry shifts the strategic calculus of U.S. decision makers, increases stand-off capabilities and alters the deterrence equation of international actors. Directed energy weapons offer a feasible approach countering the proliferation of hypersonic threats to the homeland, safeguards the decision space of our nation's leaders and potentially strengthens military, diplomatic and economic instruments of power simultaneously.This compilation includes a reproduction of the 2019 Worldwide Threat Assessment of the U.S. Intelligence Community.Speed and agility are key components in hypersonic weapons and the proliferation of such a capability will drastically alter warfare; therefore, an agile and integrated defense posture provides a feasible response to emerging hypersonic threats. As an alternative to counter

hypersonic weapons, directed energy weapons have increased in capability recently and offer a valid response these weapons. Directed energy weapons range from various types of lasers to microwave weapons. R&D breakthroughs with free electron and fiber lasers have increased laser power while reducing size for military applications. The military has begun to realize the potential advantages directed energy weapons offer combat systems and increased R&D into directed energy defense systems like the U.S. Navy exemplify the possibility of a feasible offset strategy against hypersonic missiles.The U.S. Navy has deployed a directed energy weapon onboard the U.S.S. Ponce in 2014 and intends to increase future laser defense systems to 150 kilowatts (kW).10 The Laser Weapons System (LaWS) is currently capable of targeting drones with a power output of 30 kW. The U.S. Navy plans to increase LaWS's power and could potentially boost its capabilities to an anti-ship weapon. Innovations in laser technology enable the military capability to target, track and concentrate intense energy on aircraft and flying weapons today. Hypersonic missiles construct a difficult problem for any defensive system and if they are required to intercept an ICBM; they may need to be forward deployed in order to target the vehicle in the boost phase of flight. The U.S. military will need a defensive system adaptive enough to intercept ICBMs and other hypersonic vehicles like cruise missiles in the near future. A collaborative effort of commercial and public funded R&D will produce the best opportunity for a game changing technological breakthrough in directed energy weapons like the latest laser innovations over the past decade.

Background and Issues for Congress
Nova Science Publishers
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Navy Shipboard Lasers for Surface, Air, and Missile Defense: Background and Issues for Congress Navy Lasers, Railgun, and Gun-Launched Guided ProjectileBackground and Issues for CongressThis report prepared for members of Congress and staff provides credible, current insight into the status of exotic weapons being developed for the US Navy, weapons which might be

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The aim of the book is to provide a comprehensive and unified description of high-intensity short laser pulses and their applications at the simplest level compatible with a correct physical understanding. The idea is to provide an intuitive picture of the phenomena under consideration with simple mathematical description useful for a better understanding. The book is based on the teaching experience of the graduate course of the Politecnico di Milano “HIGH INTENSITY LASERS FOR NUCLEAR AND PHYSICAL APPLICATIONS I + II” and is particularly addressed to graduate students with a background in electromagnetism; is mostly suitable for master students in Nuclear Engineering, in Engineering Physics, and in Physics and It’s recommended also to students in material sciences (or similar) and to PhD students. The text organization is due to help to follow the lessons in the classroom and to be used for self-study by students.

Project Jupiter Dorrance Publishing

Navy Lasers, Railgun, and Gun-Launched

Guided ProjectileBackground and Issues for Congress

Navy Shipboard Lasers National Academies Press

The Department of Defense's (DOD) development work on high-energy military lasers, which has been underway for decades, has reached the point where lasers capable of countering certain surface and air targets at ranges of about a mile could be made ready for installation on Navy surface ships over the next few years. More powerful shipboard lasers, which could become ready for installation in subsequent years, could provide Navy surface ships with an ability to counter a wider range of surface and air targets at ranges of up to about 10 miles. This book examines Navy shipboard laser technologies and applications for surface, air and missile defence.

Department of Defense Appropriations for ... U of Nebraska Press

Beam Weapons examines the directed-energy weapons that became a central part of the Reagan Administration's Strategic Defense Initiative, better known as "Star Wars." First published in 1984, it describes the science and technology behind directed energy weapons, the state of the art at the time Reagan launched the program, and the military issues involved. The first full-length book published on the topic, it exhaustively documents the technical and military realities and uncertainties.

Arms Control And Defense Postures In The 1980s DIANE Publishing

This book, first published in 1978, analyses the development, uses and effects of conventional anti-personnel weapons such as rifles and machine guns, grenades, bombs, shells and mines. It provides the historical, military, technical and clinical background to the international legal discussions as part of the ongoing efforts to prohibit or restrict the uses of some of the more inhumane and indiscriminate of these weapons, the most successful being the 1997 Ottawa Treaty that banned the use of anti-personnel mines.

Navy Lasers, Railgun, and Gun-Launched Guided Projectile Jeff Hecht

A laser is a device that emits light through a process of optical amplification based on the stimulated emission of electromagnetic radiation. The term "e;laser"e; originated as an acronym for "e;light amplification by stimulated emission of radiation"e;. Laser Applications provides a firm grounding in the fundamental concepts over governing the field on Optics. This reference book is useful for the students of B.E., B.Tech. and M.Tech., courses. The present book is an attempt to treat the subject of Laser as an introductory course. With recent major breakthroughs in ultrafast laser technology and femtosecond nonlinear spectroscopic techiques, Femtosecond Laser Spectroscopy is currently a burgeoning field in many branches of science, including physics, chemistry, biology, and materials science. Attempts have also been made to cover the frontline areas in the subject. The development of Laser and its various applications in Communications, Radiation, medicine, Holography etc., has been given due importance.

High-power Amplifier Free Electron Lasers National Academies Press

This book provides an up-to-date analysis of the development and deployment of 'non-lethal' weapons by police and military organizations. It reviews the key technologies, issues, and dangers, with particular attention to the development of drugs, lasers,

microwaves, and acoustics as incapacitating weapons.
Hypersonic Threats to the Homeland - Strategic Options S. Chand Publishing United States Space Force By: Paul D. Escudero United States Space Force: Project Jupiter is a stand-alone novel. On June 25, 2018, right after President Donald J. Trump announced he would pursue establishing the United States Space Force, author Paul D. Escudero saw how enormous that decision was and immediately started writing this book. The United States Space Force concept goes beyond NASA, manned space flight, and American and International Space programs. There is a great possibility that aliens exist on multiple planets scattered throughout the universe. America is great at mitigating every threat known to mankind, except the alien threat. United States Space Force is a fictional tale that describes how this all manifested into a galactic-bound space force.
The Weapons of Tomorrow Routledge "The introduction of directed energy weapons into twenty-first century naval forces has the potential to change naval tactics as fundamentally as the transition from sail to steam. Recent advances in directed energy technologies have made the development of both high-energy laser and high-power microwave weapons technically feasible. This study examines the potential adaptation of such weapons for the defense of naval forces. This study considers options for using directed energy systems on naval vessels in the context of the U.S. maritime strategy and emerging threats in international politics. The framework for this study is an integrated system of microwave devices, high-energy lasers, and surfact-to-air missiles which are evaluated in terms of their ability to enhance anti-ship cruise missile defense, tactical air defense, and fast patrol boat defense. This study also examines collateral capabilities, such as non-lethal defensive measures and counter-surveillance operations. The global proliferation of increasingly sophisticated weapons and the expanding demands placed on its ever-smaller navy require the United States to reassess its current approach to fleet operations. This study concludes that directed energy technology has made sufficient progress to warrant the development of sea-based weapons systems for deployment in the first two decades of the next century. For operational and technical reasons, a Nimitz class aircraft carrier may be the preferred platform for the initial implementation of directed energy weapons. If successful, the robust self-defense capability provided by directed energy weapons will permit a fundamental shift in carrier battle group operations from a massed, attrition-oriented defense to a more dynamic, dispersed offense."--Page iv.
Scientific Assessment of High-Power Free-Electron Laser Technology Scientific e-Resources
Basic Theory | Types Of Lasers | Laser Beam Characteristics | Techniues For Control Of Laser Output| Applications Of Lasers
Technical Abstract Bulletin Createspace Independent Publishing Platform
War at the Speed of Light describes the revolutionary and ever-increasing role of directed-energy weapons (such as laser, microwave, electromagnetic pulse, and cyberspace weapons) in warfare. Louis A. Del Monte delineates the threat that such weapons pose to disrupting the doctrine of Mutually Assured Destruction, which has kept the major

powers of the world from engaging in nuclear warfare. Potential U.S. adversaries, such as China and Russia, are developing hypersonic missiles and using swarming tactics as a means to defeat the U.S. military. In response, the U.S. Department of Defense established the 2018 National Security Strategy, emphasizing directed-energy weapons, which project devastation at the speed of light and are capable of destroying hypersonic missiles and enemy drones and missile swarms. Del Monte analyzes how modern warfare is changing in three fundamental ways: the pace of war is quickening, the rate at which weapons project devastation is reaching the speed of light, and cyberspace is now officially a battlefield. In this acceleration of combat called “hyperwar,” Del Monte shows how disturbingly close the world is to losing any deterrence to nuclear warfare.

Imperative to Develop Directed Energy and Laser Weapons With Increased Stand-off Capabilities to Guard Against Russian and Chinese Weapons National Academies Press

A Free Electron Laser (FEL) shows potential as an effective defensive weapon for a naval ship against today's modern weapons such as supersonic anti-ship missiles. A laser can destroy these fast and highly maneuverable missiles at the speed of light. Several obstacles must be overcome to employ this weapon on a naval ship. This thesis discusses several methods for passive and active jitter control of a guided optical beam which might be employed in a FEL weapon system. Vibration experiments were performed on the Laser Jitter Control Testbed at the Naval Postgraduate School to test several types of feedback and adaptive feedforward controllers. A Filtered-X Recursive Least Squares (FXRLS) adaptive feedforward controller was found to be most effective to correct a combination of both broadband and narrowband disturbances. The FXRLS controller results in a 33 dB decrease in jitter caused by a 50 Hz narrowband vibration and an 89% improvement in low frequency broadband jitter experienced by the optical beam. A proposed Free Electron Laser design employing both passive and active vibration control techniques is recommended that employs a co-linear optical reference beam for jitter control.