Laser Weapons For Naval Applications

Laser weapon

as practical, high-performance military weapons remains to be seen. One of the major issues with laser weapons is atmospheric thermal blooming, which is

A laser weapon is a type of directed-energy weapon that uses lasers to inflict damage. Whether they will be deployed as practical, high-performance military weapons remains to be seen. One of the major issues with laser weapons is atmospheric thermal blooming, which is still largely unsolved. This issue is exacerbated when there is fog, smoke, dust, rain, snow, smog, foam, or purposely dispersed obscurant chemicals present. In essence, a laser generates a beam of light that requires clear air or a vacuum to operate.

Many types of laser have been identified as having the potential to be used as incapacitating non-lethal weapons. They can cause temporary or permanent vision loss when directed at the eyes. The extent, nature, and duration of visual impairment resulting from exposure to laser…

Directed-energy weapon

microwaves, particle beams, and sound beams. Potential applications of this technology include weapons that target personnel, missiles, vehicles, and optical

A directed-energy weapon (DEW) is a ranged weapon that damages its target with highly focused energy without a solid projectile, including lasers, microwaves, particle beams, and sound beams. Potential applications of this technology include weapons that target personnel, missiles, vehicles, and optical devices.

In the United States, the Pentagon, DARPA, the Air Force Research Laboratory, United States Army Armament Research Development and Engineering Center, and the Naval Research Laboratory are researching directed-energy weapons to counter ballistic missiles, hypersonic cruise missiles, and hypersonic glide vehicles. These systems of missile defense are expected to come online no sooner than the mid to late 2020s.

China, France, Germany, the United Kingdom, Russia, India, Israel are also...

Hydrogen fluoride laser

of the laser. Deuterium fluoride lasers have found military applications: the MIRACL laser, the Pulsed energy projectile anti-personnel weapon, and the

The hydrogen fluoride laser is an infrared chemical laser capable of delivering continuous output power in the megawatt range.

Hydrogen fluoride lasers operate at the wavelength of 2.7–2.9 μm. This wavelength is absorbed by the atmosphere, effectively attenuating the beam and reducing its reach, unless used in a vacuum environment. However, when deuterium is used instead of hydrogen, the deuterium fluoride lases at the wavelength of about 3.8 μm. This makes the deuterium fluoride laser usable for terrestrial operations.

Ring laser gyroscope

C. H. et al., Multioscillator Ring Laser Gyroscopes and their applications, in Optical Gyros and their Applications (NATO RTO-AG-339 AC/323(SCI)TP/9),

A ring laser gyroscope (RLG) consists of a ring laser having two independent counter-propagating resonant modes over the same path; the difference in phase is used to detect rotation. It operates on the principle of the Sagnac effect which shifts the nulls of the internal standing wave pattern in response to angular rotation. Interference between the counter-propagating beams, observed externally, results in motion of the standing wave pattern, and thus indicates rotation.

Chemical oxygen iodine laser

laser aboard a Boeing 747 that took off from the Point Mugu Naval Air Warfare Center (for more details, see Boeing YAL-1). All gas-phase iodine laser

A chemical oxygen iodine laser (COIL) is a near–infrared chemical laser. As the beam is infrared, it cannot be seen with the naked eye. It is capable of output power scaling up to megawatts in continuous mode. Its output wavelength is 1315 nm, a transition wavelength of atomic iodine.

Free-electron laser

free-electron laser (FEL) is a fourth generation light source producing extremely brilliant and short pulses of radiation. An FEL functions much as a laser but

A free-electron laser (FEL) is a fourth generation light source producing extremely brilliant and short pulses of radiation. An FEL functions much as a laser but employs relativistic electrons as a gain medium instead of using stimulated emission from atomic or molecular excitations. In an FEL, a bunch of electrons passes through a magnetic structure called an undulator or wiggler to generate radiation, which re-interacts with the electrons to make them emit coherently, exponentially increasing its intensity.

As electron kinetic energy and undulator parameters can be adapted as desired, free-electron lasers are tunable and can be built for a wider frequency range than any other type of laser, currently ranging in wavelength from microwaves, through terahertz radiation and infrared, to the visible...

Naval Surface Warfare Center Crane Division

the command of the newly established Naval Ordnance Systems Command and began providing technical support for weapons systems including logistics, in-service

Naval Surface Warfare Center Crane Division (NSWC Crane Division) is the principal tenant command located at Naval Support Activity Crane (NSA Crane) in Indiana.

NSA Crane is a United States Navy installation located approximately 25 miles (40 km) southwest of Bloomington, Indiana, and predominantly located in Martin County, but small parts also extend into Greene and Lawrence counties. It was originally established in 1941 under the Bureau of Ordnance as the Naval Ammunition Depot for the production, testing, and storage of ordnance under the first supplemental Defense Appropriation Act. The base is named after William M. Crane. The base is the third largest naval installation in the world by geographic area and employs approximately 3,300 people. The closest community is the small town of...

Laser warning receiver

(e.g. Shtora), active laser self-defence weapon with laser dazzler (LSDW, used on the Chinese Type 99 main battle tank), laser jammer, etc.

Detectors

A laser warning receiver is a warning system used as a passive military defence. It detects, analyzes, and locates directions of laser emissions from laser guidance systems and laser rangefinders. Then it alerts the crew and can start various countermeasures, like smoke screen, aerosol screen (e.g. Shtora), active laser self-defence weapon with laser dazzler (LSDW, used on the Chinese Type 99 main battle tank), laser jammer, etc.

Detectors used in LWR are usually based on a semiconductor photodetector array, which is typically cryogenically or thermal-electric cooled. Sometimes avalanche photodiodes (APD), photoconductivity, photoelectromagnetic, or photodiffusion devices are used even without cooling. Some devices detect only the main beam of foreign lasers while others detect even scattered...

International Conference of Laser Applications

International Conference on Lasers and Applications, Lasers 'XX was an annual conference organized by the former Society for Optical and Quantum Electronics

The International Conference on Lasers and Applications, Lasers 'XX was an annual conference organized by

the former Society for Optical and Quantum Electronics. The conference, known in short by Lasers 'XX (where XX refers to the particular year), was held at various locations in The United States from 1978 to 2000.

The emphasis of these conferences was laser development and in particular the development of high-power lasers. The papers delivered at these conferences were published in a series of hard-bound volumes known as Proceedings of the International Conference on Lasers 'XX (ISSN 0190-4132) by STS Press. In total, more than 20 book proceedings were published.

A particular feature of these conferences was the organization of high-power panel discussions on timely topics of interest...

Nova (laser)

facilities studied gas lasers using carbon dioxide (e.g. Antares laser, Los Alamos National Laboratory) or KrF (e.g. Nike laser, Naval Research Laboratory)

Nova was a high-power laser built at the Lawrence Livermore National Laboratory (LLNL) in California, United States, in 1984 which conducted advanced inertial confinement fusion (ICF) experiments until its dismantling in 1999. Nova was the first ICF experiment built with the intention of reaching "ignition", the condition where self heating of the fusion plasma exceeds all losses. Although Nova failed in this goal, the data it generated clearly defined the problem as being mostly a result of Rayleigh–Taylor instability, leading to the design of the National Ignition Facility, Nova's successor. Nova also generated considerable amounts of data on high-density matter physics, regardless of the lack of ignition, which is useful both in fusion power and nuclear weapons research.