MICROWAVE ENERGY WEAPONS

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Introduction to DEW

The future weapon system that is likely to change the course of war is the Directed Energy Weapon (DEW), which is created on electromagnetic pulse effects, in addition to a variety of other means, without a nuclear blast. DEWs can be termed as the apex in weapons technology innovatory, apt for dealing with all kinds of asymmetric challenges, including unmanned and light aircraft. DEWs are capable of destroying a target by emitting and transferring extreme levels of energy towards the target. The energy emitted by DEWs can be available in the form of electromagnetic radiation, microwaves, lasers and masers, and particles with mass. DEWs encompass two distinct fields; high-energy lasers and high power microwaves.

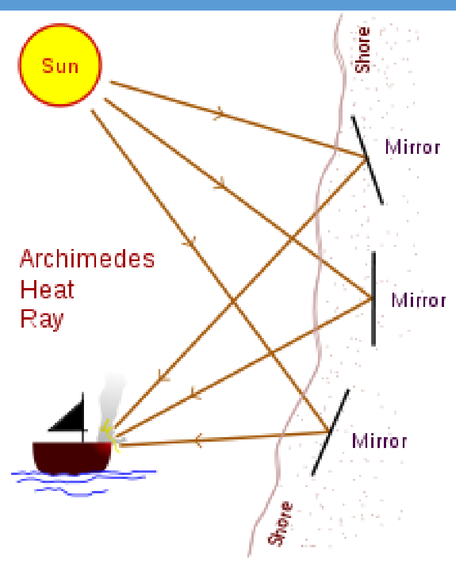
APPLICATIONS

Using laser beams and other concentrated sources, DEWs are the future in so far as military laser (acronym for "light amplification by stimulated emission of radiation") technologies are concerned. Of these, laser weapons by far lead the DEWs pack. The precision of a laser beam weapon is unrivalled owing to its speed, akin to that of light. DEWs are fast racing towards being the most sought after option in comparison to conventional projectile weapons including missile systems, given their accuracy as mentioned earlier, and the range of these weapons, which is far greater than any conventional munitions.
The applicability of laser weapons, more specifically against aerial and naval targets is significant, although the range is subject to meeting certain vital variables including atmospheric conditions and availability of power. Laser weapons can produce a series of strikes, which can be limited only by its power supply. From a military application point of view, a laser weapon is required to generate at the least, a 100-Kilowatt beam.

TYPES OF DIRECTED ENERGY

Four major categories of DEWs are:
1.PBWs
2.Microwave based DEWs
3.Laser based DEWs
4. LIPC weapons

CONCEPT



DIRECTED ENERGY WEAPON V/S KINETIC ENERGY WEAPON

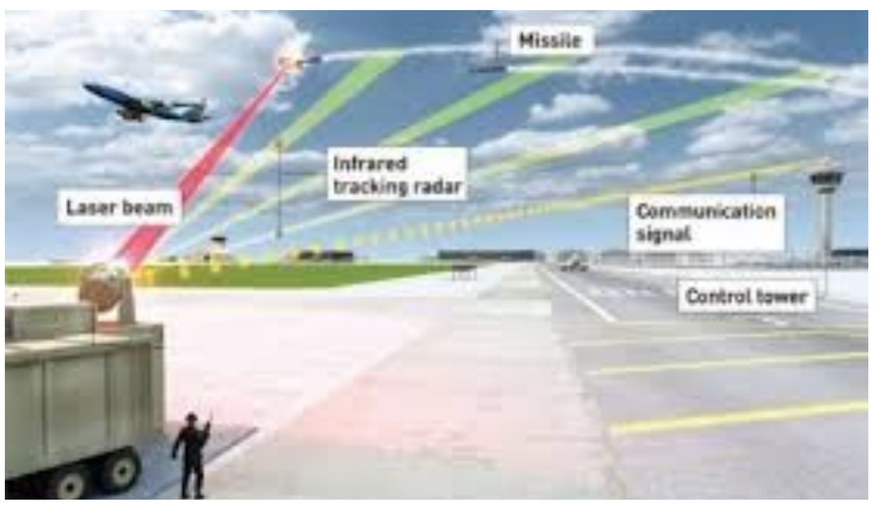
At the most fundamental level, directed energy weapons (DEWs) share the concept of delivering a large amount of stored energy from the weapon to the target to produce structural and incendiary damage effects. Kinetic energy weapons (KEWs) deliver this effect at subsonic or supersonic speeds while directed energy weapons (DEWs) do so at the speed of light.

Both kinetic energy weapons (KEWs) and directed energy weapons (DEWs) need to address two fundamental issues. The first major concern is related to travel or propagation through the atmosphere and hitting the target. In the case of KEWs, it is getting the projectile to successfully travel through the atmosphere and hit the target. In the case of directed energy weapons (DEWs), it is the propagation of high-energy beams such as high-power electromagnetic radiation or high-energy particle beams through the atmosphere and directing these to hit the target.

RADAR

Radar is an object-detection system that uses radio waves to determine the range, angle, or velocity of objects. It can be used to detect aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations, and terrain. A radar system consists of a transmitterproducing electromagnetic waves in the radio or microwaves domain, a transmitting antenna, a receiving antenna (often the same antenna is used for transmitting and receiving) and a receiver and processor to determine properties of the object(s).

The modern uses of radar are highly diverse, including air and terrestrial traffic control, radar astronomy, air-defence systems, antimissile systems, marine radars to locate landmarks and other ships, aircraft anticollision systems, ocean surveillance systems, outer space surveillance and rendezvous systems, meteorological precipitation monitoring, altimetry and flight control systems, guided missile target locating systems, ground-penetrating radar for geological observations, and range-controlled radar for public health surveillance. [5] High tech radar systems are associated with digital signal processing, machine learning and are capable of extracting useful information from very high noise levels.



PROBLEM FACED IN DEPLOYING SUCH A WEAPON

The technical problems faced in developing DEWs capable of boost phase kill for defence systems, the options available to the offense including direct attacks on DEW platforms, may be less difficult and costly to develop and may require fewer orders-of-magnitude performance improvements. A successful BMD system must survive, but survival of high value space-based assets is problematic. Ground-based assets of DEW systems are also subject to threats. Architectures which address the responsive threat are still in their infancy. As an overall BMD system employing directed energy weapons becomes more complex, the currently unresolved issues of computability, testability, and predictability become increasingly critical.

Conclusion

Directed energy weapons could have several main advantages over conventional weaponry. Direct energy weapons can be used discreetly as radiation above and below the visible spectrum is invisible and does not generate sound. Light is only very slightly altered by gravity, giving it an almost perfectly flat trajectory. It is also practically immune (in anything resembling normal planetary conditions) to both windage and Coriolis force. Lasers could possibly have much greater speed and range than conventional weapons, therefore, are suitable for use in space warfare. Hence, DEWs are likely to change the course of war and deal with all sorts of challenges.

ADVANTAGES OVER NORMAL WEAPONS

Conventional Weapons	Directed-Energy Weapons
Readily available with reloading	May have to wait to recharge between uses
Inoperable when ammunition depletes	Can always operate when power is available
Heavy ammunition – limits aircraft maneuverability (reduces loiter time)	Lightweight – allows for aircraft maneuverability (increases loiter time)
Reliable and reputable	New and untested
Expensive ammunition	Expensive R&D, but no ammunition cost
About 1 mps for bullets and 2 mps for missile[16]	About 186,000 mps (speed of light)
Generally less discriminate (less precision)	Generally more discriminate (precise accuracy)