The (HAARP) Electromagnetic system is designed to have a direct effect on the ionosphere. Examples of these effects include reddening, melting, or magnifying the layer

Dr.Afshin Rashid , Assistant Professor

Faculty member Islamic Azad University of Science and Research Branch, Tehran

- **Abstract:**

- Note : HAARP is a research project that is ostensibly for studying and researching the ionosphere layer and underground mining studies (using ELF/ULF/VLF radio waves) .

- **Keywords:** communications , VLF radio waves , electromagnetic waves , HAARP

Introduction •

HAARP can be used with the help of waves and power (frequency-voltage) in the unisphere to change the world's climate, create tsunamis, and disrupt communication-radar systems and the like.The ionosphere refers to the upper layers of the Earth's atmosphere, which are located between 50 km and 1000 km above the Earth's surface.

<u>The HAARP system is designed to have a direct effect on the ionosphere</u>

With HARP (High Frequency-Based Pulsed Energy) experiments can be performed to temporarily excite a limited region of the ionosphere, Exciting a sensitive layer such as the ionosphere can have catastrophic consequences. Skywave propagation refers to a type of propagation in which radio waves propagated in space are deflected back toward the Earth after encountering ionized layers of the atmosphere (ionosphere).The ionized region of the atmosphere begins at 50 kilometers above the Earth's surface and extends to an altitude of 400 kilometers.The ionosphere region itself is divided into three layers, which are known as the F, E, and D layers, respectively (in height).The HAARP system is designed to have a direct effect on the ionosphere. Examples of these effects include reddening, melting, or magnifying the layer.Hitting the ionosphere and returning to Earth, they are able to not only go deep into the sea, but also go further and enter the depths of the earth, and its function is similar to "Radio Thermography", which geologists use today to explore various reservoirs, including gas and oil. When a short "Radio Thermography" wave is sent into the earth, it hits different layers and vibrates those layers, and from the vibration, it produces a sound with a specific frequency and returns to the surface of the earth, and geologists are able to identify underground reservoirs from the returned sound.When the ionosphere is molten (seen in red) it then begins to beat like a heart, and from these beats, ultra-short frequencies are produced that penetrate the Earth after hitting it.

(Haarp interior)

HAARP has multiple antennas integrated on the ground. These antennas generate ELF/ULF/VLF ultra-short waves and launch them into the ionosphere. In fact, a special system (signal launch - high voltage) consisting of (180 aluminum antenna towers with a height of 23.50 meters) is formed and is located on a large land area of at least 23,000 square meters.Radiothermography is a system that vibrates subsurface layers with a power as low as 30 watts, while HAARP is a more advanced system that can vibrate the same layers of the earth using a power equivalent to 1,000,000,000 (one billion) to 10,000,000,000 (ten billion) watts.(such as vibrating the layers of the earth due to the impact of frequencies generated from the ionosphere) and then sound is produced in the ear and the listener hears it.With a little thought, it can be seen that the HAARP technology is not designed to "mine" oil and gas reservoirs. Because it does not require a billion watts to find reservoirs, and a thermograph is enough for this. Considering the effects of HAARP on the ionosphere and ultimately its effects on the Earth and the climate, these changes include drought in previously unprecedented areas, torrential rainfall in places known to be dry, hurricanes and tsunamis, and most simply, earthquakes. The waves returning from the ionosphere, after entering the depths of the sea, can cause life-threatening injuries to marine organisms, especially whales and dolphins.

ELF and VLF (Telecommunications Sciences) How they work

VLF waves, the strongest natural source of ELF/VLF waves on Earth, is lightning.The waves produced by lightning strikes can bounce back and forth between the Earth and the ionosphere, so they can travel around the world. Radio waves are also produced by artificial sources, including electrical generators, power lines, household appliances, and radio transmitters. ELF radio is useful for communicating with submarines and inside mines and caves because of its long range and its ability to penetrate water and rock.However, the carrier frequency is often below the audible frequency range, which is considered to be 20 to 20,000 Hz. For this reason, ELF radio cannot be modulated sufficiently to transmit sound, which is why it is only used for very low-speed digital data.

How ELF and VLF waves work

Waves from lightning striking the ground can travel between the Earth and the ionosphere, the highest layer of the atmosphere, so they can travel around the world. Radio waves also come from unnatural sources, such as electrical generators, overhead power lines, and radio transmitters. ELF radio waves are very suitable for communicating with submarines and inside mines and caves because of their long range and ability to penetrate water and rock. However, their frequency is often lower than the audio frequency, which is between 20 Hz and 20 kHz, and they cannot be used for fast sound reproduction. Therefore, they are only used for slow digital data transmission.

Low frequency waves ULF signal How it works in (Telecommunications Sciences)

Specific electromagnetic signals that are in the range of ULF waves and are seen in seismically active areas before a strong earthquake. In general, the appearance of these waves and the ULF signal are electromagnetic precursors of an earthquake. ULF waves are mostly of spatial and natural origin. So we can expect a series of electromagnetic-seismic precursors associated with an earthquake.

Artificially generating UFL waves (earthquake precursor)

The excitation and propagation of electromagnetic waves in very low frequency bands in the Earth's atmosphere has many applications in various fields, including space physics, radio communications, and earthquake prediction. Therefore, this frequency spectrum has always been of interest to researchers. Due to its great complexity, the study and investigation of the excitation of this type of electromagnetic waves has always been difficult. The excitation of radio waves in the extremely low frequency spectrum (ULF (Ultra Low Frequency (300 Hz to 3 kHz)) and ELF (Extremely Low Frequency (3 to 30 Hz))) in the frequency range of 3 Hz to 3 kHz, and the very low frequency spectrum (VLF (Very Low Frequency (3 to 30 kHz))) in the frequency range of 3 to 30 kHz in the E layer (ionosphere), at an altitude of 80 to 120 km above the Earth's surface. In these applications, numerical methods have been used to excite electric currents and create virtual antennas in the plasma layer to produce VLF waves.

The application of UFL waves in telecommunications science

has also been used to excite the plasma layer and change the conductivity coefficients using high-frequency electromagnetic waves of the HF band. The numerical model used in these waves includes Maxwell's laws and the conductivity coefficients of the layer (ionosphere), which is unique in its kind. This model simulates the changes in the ionosphere layer on the propagation of transmitted waves, as well as the excitation of secondary waves by combining the conductivity coefficients with Maxwell's laws for earthquake prediction, so that the calculation time is significantly reduced. The results show that ground-based antennas in the ELF frequency band have very good efficiency and can be a suitable alternative to the creation of these waves by powerful HF band transmitters, which are known to heat the upper atmosphere. Also, the penetration of pulsed waves in the ionosphere is less than 10 km at a frequency of 100 Hz, and the excitation waves have a propagation speed of about 1000 km/s. The penetration of electromagnetic waves in the Earth's atmosphere is greatly reduced by increasing the transmission frequency to the very low frequency spectrum (VLF).

EHF Extremely High Frequency (ExtremelyHighFrequency) Structure, Function

EHF, which ranges from 30 to 300 GHz, is suitable for radio navigation, space research (deep space) and (space-to-Earth). EHF does not penetrate objects but passes over their surface. This phenomenon is called the external effect of high frequency. For this reason, if a person comes into contact with a conductor carrying a high current of EHF , it may cause superficial but severe burns. EHF can easily ionize the air and create a conductive path in it. This feature is used in high frequency units for radio navigation, space research (deep space) and (space-to-Earth) , in which currents with a frequency higher than the distribution frequency are used. In telecommunications, frequency is a concept that wherever waves are regularly repeating (commuting). The general definition of frequency is the number of cycles per second (Cycles Per Second). In other words, the general definition of frequency is the number of repetitions of a repetitive task per unit of time (which is usually taken as a second). EHF frequencies are also called extremely high frequencies . The abbreviation for this group of frequencies is EHF or Extremely High Frequency, and their applications include point-to-point communication. EHF extremely high frequency, whose range is from 30 to 300 GHz, is suitable for radio navigation, space research (deep space) and (space-to-Earth).

References :

Alibakhshikenari, Mohammad, et al. "High gain/bandwidth off-chip antenna loaded with metamaterial unit-cell impedance matching circuit for sub-terahertz near-field electronic systems." Scientific Reports 12.1 (2022): 17893. http://dx.doi.org/10.1038/s41598-022-22828-3

Alibakhshikenari, Mohammad, et al. "An innovative antenna array with high inter element isolation for sub-6 GHz 5G MIMO communication systems." Scientific Reports 12.1 (2022): 7907. http://dx.doi.org/10.1038/s41598-022-12119-2

Alibakhshikenari, Mohammad, et al. "A comprehensive survey on antennas on-chip based on metamaterial, metasurface, and substrate integrated waveguide principles for millimeter-waves and terahertz integrated circuits and systems." IEEE Access 10 (2022): 3668-3692. http://dx.doi.org/10.1109/ACCESS.2021.3140156

Zandi-Pouryan, Salahedin, Behbod Ghalamkari, and Mohammad Naser-Moghadasi. "Wideband log-periodic phase shifters." International Journal of RF and Microwave Computer-Aided Engineering 31.9 (2021): e22759. http://dx.doi.org/10.1002/mmce.22759

Alibakhshikenari, Mohammad, et al. "Impedance bandwidth improvement of a planar antenna based on metamaterial-inspired T-matching network." IEEE Access 9 (2021): 67916-67927. http://dx.doi.org/10.1109/ACCESS.2021.3076975

Alibakhshikenari, Mohammad, et al. "A comprehensive survey of “metamaterial transmission-line based antennas: Design, challenges, and applications”." Ieee Access 8 (2020): 144778-144808. http://dx.doi.org/10.1109/ACCESS.2020.30136

Alibakhshikenari, Mohammad, et al. "A comprehensive survey of “metamaterial transmission-line based antennas: Design, challenges, and applications”." Ieee Access 8 (2020): 144778-144808. http://dx.doi.org/10.1109/ACCESS.2020.3013698

Amin, Ehsan, Behbod Ghalamkari, and Mohammad Naser-Moghadasi. "A novel wideband high-gain modified biquad dipole antenna." International Journal of RF and Microwave Computer-Aided Engineering 30.2 (2020): e22037. http://dx.doi.org/10.1002/mmce.22037

Fakheri, Majid, M. Naser-Moghadasi, and R. A. Sadeghzadeh. "A multi-layer circularly polarized cavity-backed SIW beam steering array for satellite application." IETE Journal of Research 68.3 (2022): 2055-2062. http://dx.doi.org/10.1080/03772063.2019.1684849

Amin, E., Behbod Ghalamkari, and Mahdi Naser-Moghadasi. "A novel dual-band dipole antenna for WLAN and LTE applications." Wireless Personal Communications 108 (2019): 2675-2683. https://link.springer.com/article/10.1007/s11277-019-06545-1

Hatami, Ahmad, and Mohammad Naser-Moghadasi. "Split ring resonator metamaterial loads for compact Hepta band printed inverted F antenna with circular polarization." Microwave and Optical Technology Letters 60.10 (2018): 2552-2559. http://dx.doi.org/10.1002/mop.31367

Daryasafar, N., R. A. Sadeghzadeh, and M. Naser-Moghadasi. "Improving multitarget tracking in synthetic aperture radar within a high-density clutter, using a technique based on the promoted PHD filtering and MTI filter." Radio Science 53.8 (2018): 963-973. http://dx.doi.org/10.1029/2018RS006592

Bakhtiari, Asghar, Ramezan Ali Sadeghzadeh, and Mohammad Naser-Moghaddasi. "Millimeter-wave beam-steering high gain array antenna by utilizing metamaterial zeroth-order resonance elements and Fabry-Perot technique." International Journal of Microwave and Wireless Technologies 10.3 (2018): 376-382. http://dx.doi.org/10.1017/S1759078717001301

Bakhtiari, A., R. A. Sadeghzadeh, and M. Naser Moghadasi. "Gain enhanced miniaturized microstrip patch antenna using metamaterial superstrates." IETE Journal of Research 65.5 (2019): 635-640. http://dx.doi.org/10.1080/03772063.2018.1447406

Alibakhshikenari, Mohammad, et al. "Printed planar antenna designs based on metamaterial unit-cells for broadband wireless communication systems." Microstrip Antennas: Trends in Research. IntechOpen, 2017. http://dx.doi.org/10.5772/intechopen.68600

Alibakhshikenari, Mohammad, et al. Miniature planar antenna design for ultra-wideband systems. intechopen, 2017. http://dx.doi.org/10.5772/intechopen.68612

Alibakhshikenari, Mohammad, et al. Metamaterial based ultra-wideband antennas for portable wireless applications. Intech, 2017. http://dx.doi.org/10.5772/66674

Alibakhshi Kenari, Mohammad, et al. "Planar antennas for reliable multiband RF communications." Metamaterials-Devices and Applications. Intech, 2017. 267-282. http://dx.doi.org/10.5772/66675

Alibakhshi Kenari, Mohammad, et al. "Metamaterial antennas for wireless communications transceivers." Modern Antenna Systems. Intech, 2017. 63-78. http://dx.doi.org/10.5772/66379

Alibakhshikenari, Mohammad, et al. "Planar antennas with enhanced bandwidth and radiation characteristics." Modern Antenna Systems. IntechOpen, 2017. http://dx.doi.org/10.5772/66381

Alibakhshi-Kenari, Mohammad, et al. "New CRLH-based planar slotted antennas with helical inductors for wireless communication systems, RF-circuits and microwave devices at UHF–SHF bands." Wireless Personal Communications 92 (2017): 1029-1038. https://link.springer.com/article/10.1007/s11277-016-3590-4

Alibakhshi-Kenari, Mohammad, et al. "Compact planar antennas for beam steering and RFID tags." Microwave Systems and Applications (2017). http://dx.doi.org/10.5772/65918

Alibakhshi Kenari, Mohammad, et al. "Multiband planar antennas for broadband wireless systems." Microwave Systems and Applications. Intech, 2017. 225-239. http://dx.doi.org/10.5772/65802

Alibakhshi-Kenari, Mohammad, et al. "Traveling-wave antenna based on metamaterial transmission line structure for use in multiple wireless communication applications." AEU-International Journal of Electronics and Communications 70.12 (2016): 1645-1650. http://dx.doi.org/10.1016/j.aeue.2016.10.003

Alibakhshi-Kenari, Mohammad, et al. "Composite right/left-handed transmission-line based wideband antenna for WLAN, WiMAX and WiFi applications." 2016 8th International Symposium on Telecommunications (IST). IEEE, 2016. http://dx.doi.org/10.1109/ISTEL.2016.7881853

Alibakhshi-Kenari, Mohammad, et al. "Periodic array of complementary artificial magnetic conductor metamaterials-based multiband antennas for broadband wireless transceivers." IET Microwaves, Antennas & Propagation 10.15 (2016): 1682-1691. http://dx.doi.org/10.1049/iet-map.2016.0069

Alibakhshi-Kenari, Mohammad, et al. "A new planar broadband antenna based on meandered line loops for portable wireless communication devices." Radio Science 51.7 (2016): 1109-1117. http://dx.doi.org/10.1002/2016RS005973

Alibakhshi-Kenari, Mohammad, et al. "Miniature CRLH-based ultra wideband antenna with gain enhancement for wireless communication applications." ICT Express 2.2 (2016): 75-79. http://dx.doi.org/10.1016/j.icte.2016.04.001

Alibakhshi-Kenari, Mohammad, et al. "Bandwidth extension of planar antennas using embedded slits for reliable multiband RF communications." AEU-International Journal of Electronics and Communications 70.7 (2016): 910-919. http://dx.doi.org/10.1016/j.aeue.2016.04.003

Alibakhshi-Kenari, Mohammad, et al. "Hexa-band planar antenna with asymmetric fork-shaped radiators for multiband and broadband communication applications." IET Microwaves, Antennas & Propagation 10.5 (2016): 471-478. http://dx.doi.org/10.1049/iet-map.2015.0608

Alibakhshi-Kenari, Mohammad, et al. "Dual-band RFID tag antenna based on the Hilbert-curve fractal for HF and UHF applications." IET Circuits, Devices & Systems 10.2 (2016): 140-146. http://dx.doi.org/10.1049/iet-cds.2015.0221

Sadeghzadeh, Ramazan Ali, Mohammad Alibakhshi-Kenari, and Mohammad Naser-Moghadasi. "UWB antenna based on SCRLH-TLs for portable wireless devices." Microwave and Optical Technology Letters 58.1 (2016): 69-71. http://dx.doi.org/10.1002/mop.29491