Vysikaylo’ cumulative plasma cannon on the protection of the Earth from meteorites

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Abstract

De Broglie reported that particles behave like waves. The author proves that de Broglie waves of free electrons in the plasma tail of a meteoroid behave like electromagnetic waves in a quantum resonator (laser) and form a beam (jet) of high-energy electrons directed into the meteoroid. A jet of high-energy electrons formed in the plasma tail behind the meteoroid sprays the meteoroid with the help of a Coulomb explosion (or a series of them). Based on this idea, we proposed and investigated a new 4D inertial-polarization-quantum cumulative-dissipative Vysikaylo’s mechanism for the fragmentation of meteoroids and small comets (self-protection of the Earth from meteoroids) into simple ions and electrons.
VYSIKAYLO' CUMULATIVE PLASMA CANNON ON THE PROTECTION OF THE EARTH FROM METEOROIDS

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This year marks the 10th anniversary of the destruction Chelyabinsk' meteoroid!

Keywords:
Vysikaylo’s plasma cumulative-dissipative structures; coulomb explosion; runaway electrons; impulse advancement of lightning; Schonland's lightning experiments (1934-1937), Vysikaylo’s mechanism of meteoroid fragmentation.

Introduction:
De Broglie reported that particles behave like waves. The author proves that de Broglie waves of free electrons in the plasma tail of a meteoroid behave like electromagnetic waves in a quantum resonator (laser) and form a beam (jet) of high-energy electrons directed into the meteoroid. A jet of high-energy electrons formed in the plasma tail behind the meteoroid sprays the meteoroid with the help of a Coulomb explosion (or a series of them). This phenomenon in the plasma cumulative-dissipative structure of Vysikaylo, limited by Coulomb barriers in the plasma tail behind the meteoroid ~20 km long (Fig. 1), is associated with cumulative and dissipative processes of transformation of the mechanical energy of the entire meteoroid into electrical energy and then into the energy of meteoroid destruction and its spray up to positive ions and electrons. The kinetic energy of the meteoroid is enough for this with a margin. In this phenomenon, as proved in this article, the virial theorem is fulfilled: half of the Coulomb energy (equal to the kinetic energy of the meteoroid) goes to form a beam of high-energy electrons catching up with the meteoroid, and the other half goes to dumping positive ions along the plasma tail behind the meteoroid, in the direction opposite to the motion of the meteoroid. This is how the Vysikaylo’s cannon is formed, shooting at the meteoroid. As a recoil in such a cannon, positive ions are ejected in the opposite direction of the meteoroid motion. Based on this idea, we proposed and investigated a new 4D inertial-polarization-quantum cumulative-dissipative Vysikaylo’s mechanism for the fragmentation of meteoroids and small comets (self-protection of the Earth from meteoroids) into simple ions and electrons. The mechanism is based on the similar coherent behavior of de Broglie waves of electrons in the plasma tail behind the meteoroid and in front of pulsed lightning from negatively charged clouds. The formation of a cumulative electron jet in front of an impulsively moving lightning was studied in detail in the experiments of Schonland et al. in 1934-1937 [1]. The physical explanation of such functioning of lightning (~2 km in size) from negatively charged clouds to positively charged clouds was first given in [2].

Coulomb mechanism of meteoroid fragmentation
Behind a fast-flying (10-40 km/s) meteoroid or other object in the Earth's atmosphere, the air is heated and strongly ionized. At a meteoroid velocity of 20 km/s, the energy received by air molecules is about 50 eV. This is three times the ionization potential of air molecules. The more mobile electrons leave the ionization region, the more the plasma is polarized and a radially self-cumulating plasmoid (Fig.1) is formed in the wake of the meteoroid (the Vysikaylo' cumulative-dissipative structure). A cumulative jet (CJ) of high-energy electrons behaving coherently, like electromagnetic radiation in a laser, accumulates (focuses) the energy stored throughout the plasmoid - in a huge storage capacitor of electrical and kinetic energies (Fig.2a). The plasmoid grows linearly with the speed of a meteoroid. The flow of high-energy electrons
catching up with the meteoroid periodically explodes the meteoroid with a electrons (Coulomb forces) and accelerates its parts, including in the direction of the meteoroid (Fig.2b). We estimated the parameters of the high-energy electron beam for lightning (~2 km) in [2], and for the plasma tail of the Chelyabinsk meteoroid (its length is ~20 km) in [3,4]. According to the Coulomb mechanism proposed by us [3,4] and according to the virial theorem: half of the entire kinetic energy of a meteoroid goes to its destruction and acceleration of its parts by a beam of fast electrons, and the other half goes to discharge positive ions into the upper layers of the atmosphere (up to heights of 70-80 km). In [3,4], we explained all the phenomena observed by eyewitnesses during the complete destruction of the Chelyabinsk meteoroid at an altitude of 23 km.

Fig.1. This is a photograph [5] of the Coulomb explosion [3] that breaks the 2013 Chelyabinsk meteoroid to ions and electrons. This phenomenon is clearly electrical in nature, like the sparking of contacts in a trolleybus or tram, or a cathode spot that “spits out pieces” of the cathode (see [3,4] for more details).

Fig.2. Two-dimensional scheme:

a) a Vysikaylo’ railgun with a space charge operating on Coulomb (polarization) forces [3,4], and not on Lorentz forces (as in the Artsimovich railgun). “+” and “-” - represent the separation of the space charge (polarization) of the plasma behind a rapidly moving object - A in the medium. Behind body A, a cumulative jet (CJ) of electrons is formed in a positively charged plasma column, converting the potential energy of polarization (the kinetic energy of the meteoroid) into energy CJ;

b) a new cumulative-plasma mechanism of fractal fragmentation of meteoroids, initiated by Coulomb explosions. This mechanism was proposed by the author in [3,4]. A is a fast moving object in an electronegative medium. B - exploding fragments that form a jet engine behind object A and simultaneously destroy it from behind, thereby supplying the engine with a new high-energy "fuel" with an energy of 200 eV per atom of already solid fuel (at a meteoroid speed ~20 km/s).

Conclusion

In [3,4] we have proposed for the first time a model of the Coulomb explosion of a meteoroid. The formation of plasma structures, plasmoids, is caused by the radial focusing (cumulation) of a positive charge by returning electrons. The results obtained by us are compared with the experimental observations of Schonland (1934-1937) [1] for the pulse-periodic advance of linear lightning near the Earth’s surface. Based on the de Broglie hypothesis: “particles behave like waves”, we have shown that de Broglie waves of electrons in plasmoids can behave like electromagnetic waves in quantum generators (lasers) — form longitudinal opposite energy flows from a plasmoid resonator if there is an external electric field. In [3,4] we explained the processes of radial cumulation of all energy-mass-momentum flows to the center of a positively charged plasma structure behind a meteoroid. The escape of free high-energy electrons and the constant growth of a positively charged region behind a
moving meteoroid (Fig.2a) is a generator of an electric field affecting the formation of a beam of high-energy electrons escaping into the meteoroid and a stream of positive ions tending in the opposite direction. Since the charge of electrons is equal to the charge of positive ions, the forces and work of the electric field on the flows of electrons and positive ions are equal. As a result, the virial theorem is realized in the form of two quasi-neutral counter flows to and from the meteoroid. The analogue of a fully reflecting mirror in the case of a plasmoid (Fig.1) is the end of the tail, a positively charged plasmoid (at a distance of 20 km from the meteoroid). The analogue of a transparent mirror is the meteoroid itself, which gives rise to another element of a positively charged plasmoid (Fig.2b). The results we obtained in [3,4] are useful for completely new discoveries, explanations of paradoxes and the development of completely unexpected new technologies - flying on your own plasma tail. After analyzing these visualized phenomena, we come to understand that photographs (Fig.1) and videos [5] are undoubtedly worthy of the highest awards and commendations. They completely reverse the "classical" mechanical concepts of many natural phenomena, transferring them from the class of phenomena in the "quasi-liquids" of Chernogor [6] to the class of cumulative-dissipative synergetic (coherent) plasma processes in the Vysikaylo’ cumulative-dissipative structures.

Within the framework of only a mechanical model [6], Chernogor could not explain the whole range of amazing phenomena that occurred during the penetration of the Chelyabinsk meteoroid in 2013 into the Earth's electronegative atmosphere and recorded in [5] and in photo 1! All these processes can be explained only on the basis of the theory of cumulative-dissipative plasma structures of Vysikaylo, with the involvement of cyclic plasma-chemical processes [3,4]. These processes are significantly enhanced by mechanical processes with explosions and spraying of small fragments up to ions (after the next crushing of the meteoroid) and are accompanied, in turn, by charge separation due to the difference in the masses of electrons and positively charged ions (Fig.2). All the kinetic energy of the parts of the meteoroid goes into the internal energy of the plasmoid and then into the electrical energy of the capacitor, which gives it to the electrons escaping from the plasmoid. In this case, the role of electron-electron collisions in the formation of a beam of high-energy electrons escaping into a meteoroid is essential. This follows from the presence of an electrophonic effect observed by a number of witnesses to the event in Chelyabinsk [3,4].

References: