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Short Communication

Thermonuclear Reaction in the Installation of a Mirror Trap plus a Tokamak

Aksenov Valentin Vasilyevich*

Doctor of Physical and Mathematical Sciences, Professor, Chief Researcher of the Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Russia

Abstract

The article proposes to combine two different concepts of thermonuclear fusion on Earth. It is proposed to combine thermonuclear fusion in tokamaks and thermonuclear fusion in mirror traps in mirror traps and make this concept fundamentally static, similar to a thermonuclear bomb, excluding any forced movement of neutral plasma in either magnetic or electric fields.

More Information

***Address for correspondence:** Aksenov Valentin Vasilyevich, Doctor of Physical and Mathematical Sciences, Professor, Chief Researcher of the Institute of Computational Mathematics and Mathematical Geophysics SB RAS, Novosibirsk, Russia, Email: aksenov@omzg.sscc.ru

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Introduction

The fundamental drawback of reproducing a thermonuclear reaction in tokamaks is the "mandatory breakdown" in the design in the first fractions of a second after launch. According to work [1], this breakdown is caused by the possible mutual generation of poloidal external and toroidal internal magnetic fields in the tokamak donut according to the formulas from [1-4]:

$$\nabla \times \boldsymbol{H}_P = \chi \boldsymbol{H}_T, \quad \nabla \times \boldsymbol{H}_T = \boldsymbol{H}_P. \qquad (1)$$

Here: $\boldsymbol{H}_P$ - is the force poloidal magnetic field of an external source, $\boldsymbol{H}_T$ - is the non-force toroidal magnetic field created by the electric current of the tokamak toroidal coil as a result of magnetic reconnection [5], $x = \gamma / \eta$ - is the electromagnetic constant: at $t = 0$, where γ is the field diffusion rate, η is the magnetic viscosity, $(i\omega\mu\sigma)^{1/2}$ - at $t > 0$, where ω is the angular frequency, μ is the magnetic permeability, σ is the specific conductivity, the force magnetic field exists according to the formula that checks the Lorentz force: $\boldsymbol{F}_L = [\boldsymbol{j}_T \times \boldsymbol{B}_P] = [\sigma \boldsymbol{E}_T \times \mu \boldsymbol{H}_P] \neq 0,$ the non-force magnetic field is checked similarly: $\bar{\boldsymbol{F}}_L = [\boldsymbol{j}_T \times \boldsymbol{B}_T] = [\chi \boldsymbol{H}_T \times \mu \boldsymbol{H}_T] = 0.$

This effect is accompanied by the loss of the Lorentz force in the magnetic field inside the toroid as a result of magnetic reconnection [2]. Therefore, the main task in experiments in tokamaks, from our point of view, is to combat the mutual generation of magnetic fields, since mutual generation leads to a breakdown in the magnetic field in the tokamak design [1].

In mirror tubes, this problem does not disappear. Another one is added. A practically insoluble problem of plasma outflow through the ends of the mirror tube appears.

This note is devoted to a discussion of these fundamental problems, formulating the unification of two different concepts into one, called thermonuclear fusion in probkomake.

Justification of the tokamak

It is proposed to connect the ends of the mirror tube and obtain the same tokamak donut. The problem of the influence of the ends of the tube through which the plasma flowed is solved at once.

Deuterium and lithium deuterite are placed inside the tube, now a donut. When lithium deuterite is heated, tritium molecules are formed. Their combination with deuterium molecules at high temperatures provides the release of the necessary energy.

The plasma resulting from the reaction must be pressed to the center of the tube by an external constant magnetic field of high intensity using magnets, similar to those used in tokamaks.

There should be no toroidal magnetic field inside the tube, as well as no electric field along the donut of the tube. The movement of neutral plasma particles by a forced magnetic or electric field should be excluded.

The external magnetic field of the magnets should be directed across the donut-tube. It should hold the heated plasma in a donut-shaped tube. Small concentrations of deuterium and tritium at high temperatures should enter into a reaction of synthesis of light elements without causing an explosion. One can also think about catalysts for the reaction of synthesis of light elements.

Removal of fusion energy is a separate task, which is not considered here

Conclusion

Engineering solutions for the installation for the implementation of a thermonuclear reaction require experimental development. The idea of the installation, presented in the article, is a fundamental conclusion, going back to the new electrodynamics, which is very sparingly described in the article due to space savings. First, it is necessary to familiarize yourself with the extensive articles from the literature 3 and 4, where the basics of the new electrodynamics are presented in detail.

References

1. Aksenov VV. On the mutual generation of magnetic fields in tokamaks and its suppression. News of Universities. Physics. 2018;(9):171–2.
2. Aksenov VV. Physical and mathematical foundations of reconnection of magnetic and electric fields in three-dimensional regions. Theory and applications. In: Interuniversity International Congress. Higher School: Scientific Research. Moscow; 2025;1:109–19.
3. Aksenov VV. Non-force electromagnetic fields. Int J Phys Res Appl. 2020;(3):20–45. Available from: https://www.physicsresjournal.com/journals/ijpra/ijpra-aid1021.php
4. Aksenov VV. Non-force electromagnetic fields in nature and experiments on earth: Part 2. Int J Phys Res Appl. 2020;(3):75–114. Available from: https://www.physicsresjournal.com/ijpra/article/view/ijpra-aid1026/pdf
5. Priest E, Forbes T. Magnetic reconnection: magnetohydrodynamic theory and applications. Moscow: Fizmatlit; 2005;592.