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THE PLASMA TRANSFORMER OF ENERGY AND THE ELECTROMAGNETIC VORTICAL REACTOR FOR ITS REALIZATION

Abstract

The plasma energy generator and the electromagnetic vortical reactor for its realization are offered. The sphere of invention is methods and devices of plasma physics, in particular - systems intended for an electromagnetic retention of high-energy plasma in the interests of a creation of conditions for an activation of high-temperature reactions, including nuclear reactions of a synthesis.

The invention contains the working chamber with the working body placed in a field of an electromagnetic system of a retention and heating of plasma. This system includes, at least, two electromagnetic vortical reactors with opposite charges and mutually opposite focused spins.

Reactors contain systems of excitation in them of the plasma state of the working body. Each system has the generator of superhigh-frequency vortical electromagnetic field of the high voltage, what axis coincides with an axis of vortical area of a reactor.

Claims

1. The plasma transformer of energy containing the working chamber with a working body, placed in a field of an electromagnetic system of a retention and heating of the plasma, characterized in that with the purpose of the increase of a plasma stability and the prolongation of reaction time the electromagnetic system of a retention and heating of a plasma contains at least two electromagnetic vortical reactors with opposite charges and mutually opposite spins, which vortical fields are located in the working chamber.

2. The plasma transformer of a energy on claim 1, characterized in that the working chamber is made as flowing and has input and output channels, which are connected by the external contour containing consistently of connected mechanical a energy transformer, a refrigerator, a receiver and the compressor.
3. The plasma transformer of energy on claim 1, characterized in that the working body contains a liquid phase in the working chamber.
4. The plasma transformer of energy on claim 1, characterized in that the working body contains a solid phase in the working chamber.
5. The electromagnetic vortical reactor containing the working chamber and the excitation system of a plasma state of a working body, characterized in that with the purpose of increase of a plasma stability and a time prolongation of the reaction the excitation system of a plasma state of a working body contains the concentrator of a superhigh-frequency vortical electromagnetic field of a high voltage, which axis coincides with an axis of the vortical field of a reactor.
6. The electromagnetic vortical reactor on claim 5, characterized in that the concentrator of a rotating superhigh-frequency electromagnetic field is executed in the form of the wave-guide ring resonator connected with a working body, located in the field of an axis of the vortical field of a reactor.
7. The electromagnetic vortical reactor on claim 5, characterized in that it contains the transfer system of an initial electrical charge in area of an axis of the vortical field of a reactor.
8. The electromagnetic vortical reactor on claim 5, characterized in that it contains the system of a preliminary ionization of a working body in the area of an axis of the vortical field of a reactor.
9. The electromagnetic vortical reactor on claim 5, characterized in that it contains the transfer system of the initial magnetic moment in a area of an axis of the vortical field of a reactor.

Description

FIELD OF THE INVENTION

The invention relates generally to the field of plasma physics, and, in particular, to methods and devices for the plasma retention. The plasma retention is particularly of the interest for the purpose of enabling a nuclear synthesis reaction. The invention can be used also for plasma separation of a crude oil and the activation of other high-temperature reactions.

BACKGROUND OF THE INVENTION

The retention of high-temperature plasma is a key problem of the controllable thermonuclear synthesis. Now there are two retention methods.

The first method is inertial, for example, with initiation of reaction by means of the laser (See, for example, the patent of the USA № 6,418,177; Stauffer et al.; July 9, 2002; Int. Cl. H05H 1/22, US Cl. 376/152).

The second method is based on retention of high-temperature plasma by a magnetic field (See, for example, С. Ю. Лукьянов, Н. Г. Ковальский. Физика горячей плазмы и управляемые термоядерные реакции. М., Изд-во МИФИ, 1997).

The focusing of the big energy in very small volume and the complex system of a submission of a working body is a main problem of the first method. The suppression of plenty instabilities is the main problem in systems with a magnetic confinement of plasma. All of instabilities have a gas-dynamic origin and are connected with a lot of fluctuation types in magnetized plasma. Therefore they are inherent practically completely.

The device under the Patent USA № 7,119,491 (Rostoker et al.; October 10, 200; Int. Cl. H01J 7/24, US Cl. 315/111.21) is the nearest prior art for the offered engineering solution.

The known device contains the working chamber with the working body placed in a field of an electromagnetic system of a retention and heating of plasma. It contains also system of excitation of a plasma state of a working body in the working chamber. A base of an electromagnetic system of a retention and heating are electromagnets, which generate a pulsing circular toroidal magnetic field with screw components around of an axis of a torus.

The limited stability of the plasma and the small time of a synthesis reaction is a limitation of the known device. The limitation has a gas-dynamic origin and is connected with a lot of fluctuation types in magnetized plasma. Therefore they are inherent practically completely.

The increase of stability of plasma and the prolongation of a reaction time is the purpose of the invention.

SUMMARY OF THE INVENTION

Object of the invention is reached by that an electromagnetic system of a retention and heating of the plasma, characterized in that with the purpose of the increase of a plasma stability and the prolongation of reaction time the electromagnetic system of a retention and heating of a plasma contains at least two electromagnetic vortical reactors with opposite charges and mutually opposite spins, which vortical fields are located in the working chamber.

The working chamber can be made as flowing and can have entrance the working chamber is made entrance and target channels which are connected by the external contour containing consistently of connected mechanical a energy transformer, a refrigerator, a receiver and the compressor.

The working chamber can be made flowing and can have input and output channels, which are connected by the external contour containing the consistently connected mechanical energy transformer, a refrigerator, a receiver and the compressor.

The working body can contain a liquid phase in the working chamber.
The working body can contain a solid phase in the working chamber.

Object of the invention is reached also by that the excitation system of a plasma state of a working body of each electromagnetic vortical reactor contains the concentrator of a superhigh-frequency vortical electromagnetic field of a high voltage, which axis coincides with an axis of the vortical field of a reactor.

The concentrator of a rotating superhigh-frequency electromagnetic field can be executed in the form of the wave-guide ring resonator connected with a working body, located in the area of an axis of the vortical field of a reactor.

The electromagnetic vortical reactor can contain system of transfer of an initial electrical charge in area of an axis of the vortical field of a reactor.

The electromagnetic vortical reactor can contain system of preliminary ionization of a working body in the field of an axis of the vortical field of a reactor.

The electromagnetic vortical reactor can contain system of transfer of the initial magnetic moment in area of an axis of the vortical field of a reactor.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings, in which like reference numerals refer to like components.

Fig. 1 shows the block diagram of the plasma transformer of energy.

Fig. 2 shows the relative positioning of two electromagnetic vortical reactors with opposite charges and opposite focused spins.

Fig. 3 shows the configuration of electrical and magnetic fields, and also the Poiting vector in one of phases of a superhigh-frequency electromagnetic field in a reactor.

Fig. 4 shows the arrangement of fields, and also the direction of a stream of the general energy.

Fig. 5 shows the block diagram of an electromagnetic vortical reactor with presented to a cut the concentrator of a superhigh-frequency vortical electromagnetic field.

Fig. 6 shows the general view of the wave-guide parts of an electromagnetic vortical reactor.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The plasma transformer of energy, which block diagram it is presented on Fig. 1, contains the first electromagnetic vortical reactor (1) and the second electromagnetic vortical reactor (2). Their vortical zones (3) and (4) are established between input (5) and the output (6) channels. The working body (7) fills the input channel (5). The output channel (6) is connected to the transformer of the mechanical energy (8), supplied by an output shaft (9). The output of the transformer of a mechanical energy (8) is connected to the entrance channel (5) through a refrigerator (10), a receiver (11) and the compressor (12).

The relative positioning of two electromagnetic vortical reactors (3) and (4), which are presented on Fig.2, is characterized by opposite charges of their vortical zones (3) and (4), and also opposite orientation of directions of rotation, i.e. their spins.

The field configuration, which is presented schematically on Fig. 3, corresponds to one of phases of a rotating variable electromagnetic vortical field. In it the electric field (13) has the shape of the dipole located across a vertical axis. The magnetic field (14) in this electromagnetic vortex has the shape of the ring located in a vertical plane. Vectors of electrical and magnetic fields are perpendicular mutually in places of crossing. Therefore Poiting vectors (15) here are perpendicular to both fields and are directed so, that create the mechanical moment concerning the general axis conterminous with an axis of the vortical field of a reactor (16).

The average stream of the vortex energy (17), which shown on Fig.4, is located concerning all system of variable fields so, that it forms a ring around of the general axis of the vortical field of a reactor (16). Here is present the example with a wave of type H_{01}.

The electromagnetic vortical reactor, which the block diagram it is represented on Fig. 5, contains the ring resonator (18) presented by a cut, which is located on an axis of the vortical field of a reactor (16). The input wave-guide (19) is attached to the external party of the resonator (18). The superhigh-frequency wave (20) is spread in an input wave-guide. The ring resonator (18) contains elements of a connection with the space inside of a ring in the field of an axis of the vortical field of a reactor (16). The electrical connection is carried out through probes (21), and the magnetic connection is carried out through the open wave-guides (22). The resonator (18) is connected to an input wave-guide (19) through windows of connection (23). The free part of an input wave-guide is connected to the coordinated loading (24). Probes (21) are connected on a direct current to a source of a constant voltage (25) through an outcome in the form of an inductive element (26). The field from a source of an ionizing radiation (27) blocks space of the ring resonator (17), which is located in the field of an axis of the vortical field of a reactor (16).

The general view of the wave-guides part of an electromagnetic vortical reactor, which is presented on Fig. 6, includes images of connected among themselves of the ring resonator (18), an entrance wave-guide (19) and the coordinated loading (24). The ring resonator (18) is located on an axis of the vortical field of a reactor (16) and has output elements: probes (21) and the open wave-guides (22).

The offered devices work as follows.

Working zones, close to an axis of electromagnetic vortical reactors (1), and (2) plasma transformers of energy are filled by a cold working body (7) in a starting position (see Fig. 1). Its work begins after inclusion of electromagnetic vortical reactors (1) and (2), the block scheme of each of which is shown on Fig. 5. It occurs after the action of a superhigh-frequency wave (20) on an input of a wave-guide (19) of each electromagnetic vortical reactors (1) and (2). Simultaneously with it the source of a constant voltage (25) in each reactor step in, and also a source of an ionizing radiation (27) is joined. Superhigh-frequency waves acts from wave-guides (19) in ring resonators (18) through windows of connection (23). The superhigh-frequency wave acts through probes (21) and the open wave-guides (22) in the field of axes of vortical field of reactors (16), where rotating vortical superhigh-frequency electromagnetic fields are created. The inductive element (26) provides an outcome between stationary values electrical and variable electromagnetic fields.

In a starting position high-frequency discharges are absent in a vortical area of each reactor. Therefore in this phase of a process the Q-factor of ring resonators (18) has the maximal quantity. As the result an intensity of fields in vortical area exponentially accrues up to the breakdown quantities. The breakdown reduces sharply the resistance of loading of resonators. It accordingly reduces their Q-factor. So processes of each of discharges are stabilized. Electromagnetic vortexes with the structure shown on Fig. 3 and Fig. 4 are as a result shaped.

The generated electromagnetic superhigh-frequency vortexes are focused one concerning another how it is shown on Fig. 2. Their charges have opposite signs, and spins are directed to the opposite parties. Therefore their relative positioning in space is not stable. After formation of vortexes the phase of their interaction begins. This interaction leads to that they approach and are mutually destroyed – are dematerialized. Thus in small volume all energy, which has been saved up in resonators and electromagnetic vortexes, is released.

The time of a dematerializing process is much less, than the period of one superhigh-frequency wave. I.e. it so a little, that any gas-or hydrodynamic processes have not time to develop. Therefore they have not time to affect all pulsing process. If medium in the beginning was in liquid or in a solid state there is a hydraulic surge or impact. All it causes achievement of extremely high pressures and temperatures in a zone of interaction of vortexes. It stimulates in short term high-temperature chemical or nuclear reaction.

The process described above has pulsing character. The frequency of such impulses should get away in view of the minimal duration of a pause between impulses and demanded average intensity of process. The minimal duration of a pause is defined by time of calm of system, which is connected with hydrodynamics of process and, hence, has on more orders the greater length, than time of electromagnetic process of vortexes formation. Therefore sources of a superhigh-frequency wave can work with the big intermittency factor of impulses, i.e. in the reduced operating condition. Average intensity of process can be adjusted by change of pulse ratio depending on opportunities of expenditure of useful energy and system of cooling. Time of functioning of the offered devices has no basic restrictions.

Thus, the offer combines advantages of inertial and magnetic methods of plasma retention, excepting their defects. It provides increase of stability of plasma condition and unlimited prolongation of time of reaction. Hence, the offer leads to achievement of the purpose of the invention.

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The plasma transformer of energy and the electromagnetic vortical reactor for its realization

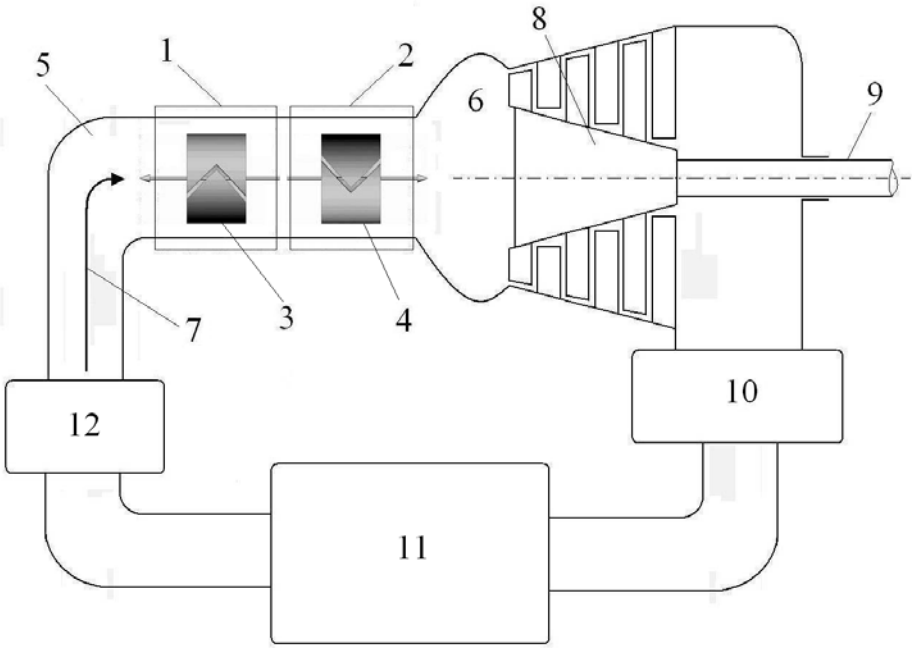

Fig. 1

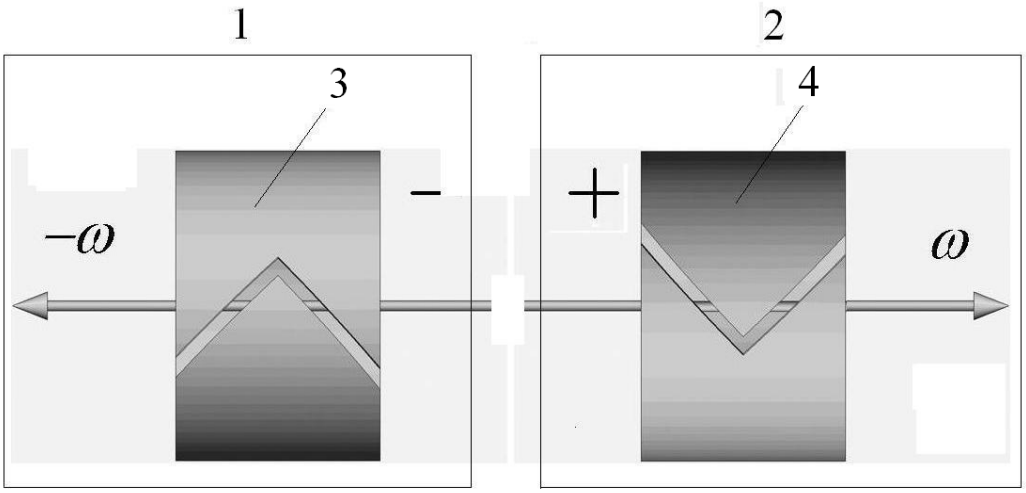

Fig. 2

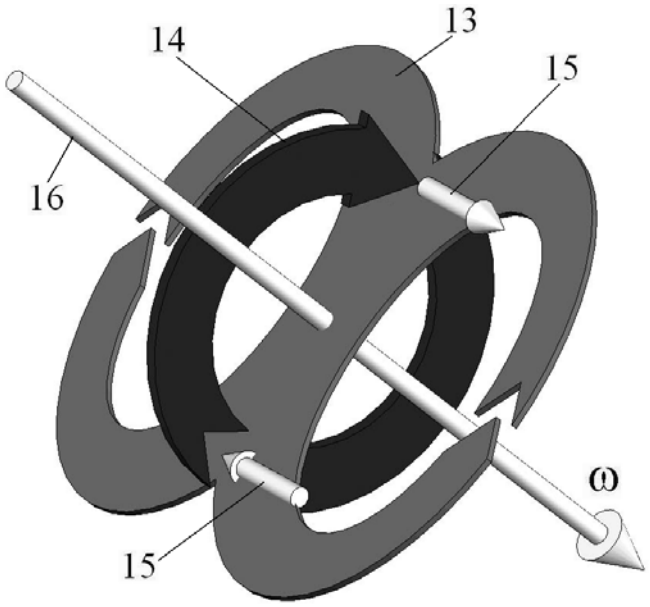

Fig. 3

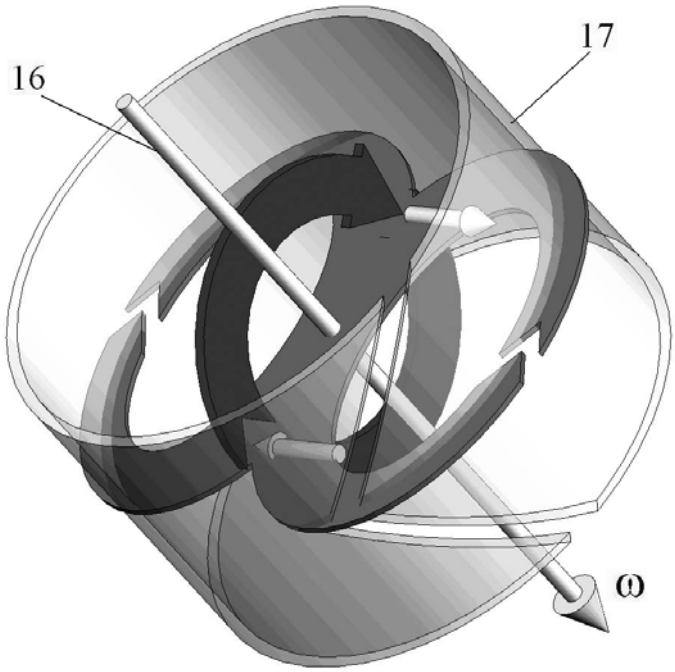

Fig. 4

The plasma transformer of energy and the electromagnetic vortical reactor for its realization

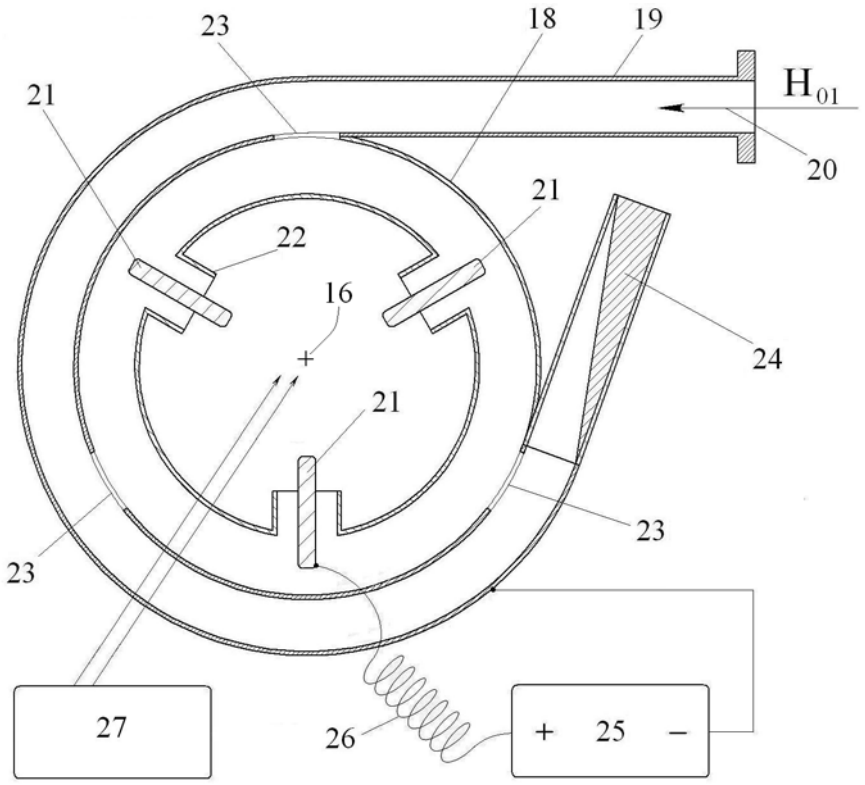

Fig. 5

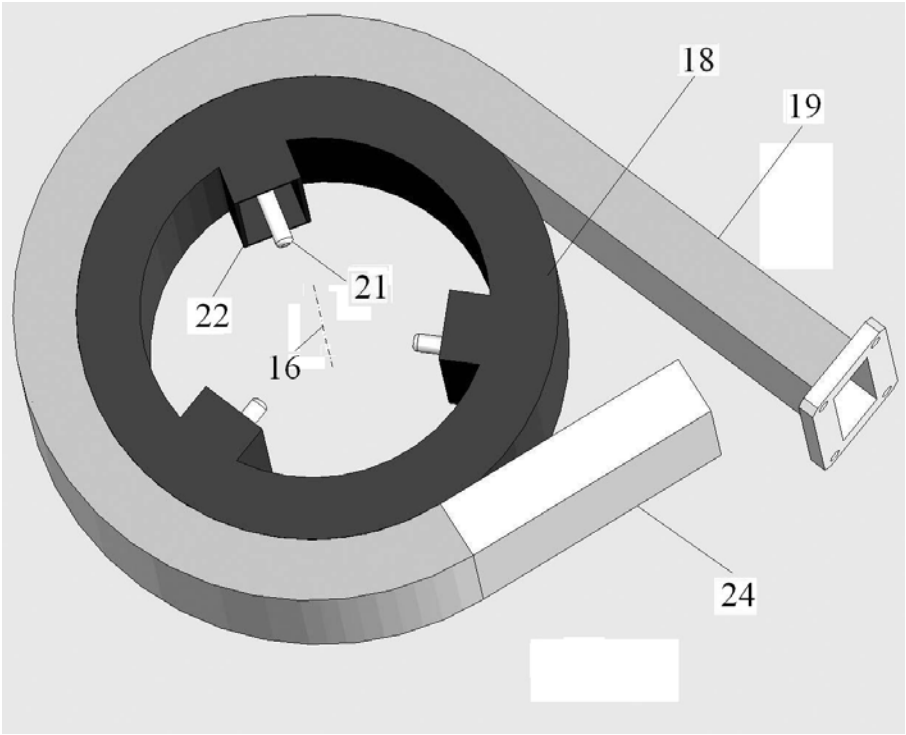

Fig. 6

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