UDC 533:621.044:62-63/64

INFLUENCE OF MAGNETIC FIELD ON THE PROCESS OF PLASMA CHEMICAL BURNING OF LIQUID COMPOSITE BIOFUEL.

Y. Kozhevnikov, V. Chirkov, Y. Egorov, V. Nikolaev, Y. Shchekochikhin

For the combustion of biofuels and composite acceleration of chemical reactions in the combustion chamber to use an external magnetic field induction coils of power in the form of a torus. The magnetic field induction coils of power in the form of a torus has a pronounced vortex nature. A more detailed study of the processes of electrodynamics and the electromagnetic field of induction coils of power in the form of a torus based on the equations and theorems of mathematical physics.

As a result, equations that form the basis of the following description of physical and chemical processes occurring in the combustion chamber of the boiler for efficient combustion of biofuel mixtures under the influence of external magnetic fields of the toroidal coil.

When testing the incineration composite biofuel disperse fuel mixtures under the simultaneous action of the electromagnetic microwave field and ultrasonic cavitation on the combustion process has been found that under certain conditions, particularly at high Content aqueous fraction occurs unstable combustion of the dispersion medium which does not allow to optimize process by increasing the flow velocity and increase the thermal efficiency of the entire system.

The purpose of research - the study of the influence of magnetic field on the plasma-chemical process of combustion of liquid composite biofuels.

Materials and methods of research. To optimize the need for more detailed study of the mechanisms of action of a magnetic field on the fuel mixture at all stages of the process, including not only the stage of direct combustion, and the step of forming the jet before it is fed into the combustion device. In this respect two approaches are considered magnetic field generating desired configuration.

In our system, initially there are two types of waves:

1) ultrasonic waves in the fuel mixture fed through the nozzle into the combustion chamber;

2) The electromagnetic wave of the microwave radiated and plasma torches acting on particles of the fuel mixture.

The results of research.

The plasma in the combustion chamber

Plasma is considered to be a special state of matter in which it is partially or completely ionized gas. From conventional gas plasma it is different in that it contains a sufficiently high concentration of charged particles - electrons and ions, whose motion creates the magnetic field, and vice versa, the magnetic field effect on the motion of charged particles.

The presence of electric charges in the flames have Thomson, who claimed: "The electric field can be used to intensify the combustion processes."

The presence in the space of the combustion chamber of the external magnetic field provides an additional effect on the moving charges, primarily on the electrons that acquire the energy to the microwave field, are capable of forming active radicals which initiate a branched-chain reaction. This creates favorable conditions for a rapid and complete combustion of biofuel composite emulsions and suspensions.

Creation of an external magnetic field of the plasma

It is known that the strongest magnetic field creates a toroidal conductor system, in which the electric current flows.

When the cross section of the torus bitangent plane, a curve of the fourth order, and the curve of intersection is the union of two circles, called circles Villars.

A study of the properties of the torus: what you need to arrange the microwave plasma torches (spark to ignite) and what they should be settings to maximize the rate of formation of free radicals. It was found that microwave plasma torches set necessary so that the ignition of the fuel mixture is performed in a plane circles Villars.

The burner design

The proposed design of the combustion chamber with a microwave plasmatron unlike existing solutions offered to apply the following. Microwave plasma torches are arranged at an angle of 30 ° to the axis of symmetry of the nozzle of the circle plane Villars. To suppress the ambipolar diffusion of charged particles in the combustion chamber has an internal screen.

When using a microwave plasma torches at a frequency of 2.45 MHz, we have a wavelength in 12.245 cm. It is possible to define the parameters of some elements of the structure.

1. The inner diameter of the screen should be more than 12.45 cm.

2. The height of the cylinder is used as a screen to be more

12.245 x 1.5 = 18.37 cm.

3. The gap between the inner wall of the combustion chamber and the outer wall of the cylinder should be less than 6.22 cm.

Implementation of paragraphs 1 and 2 causes the smooth distribution of the microwave field directly in the ignition. Performing proliferation claim 3 provides the alternating microwave field in the space between the inner wall of the combustion chamber and the outer wall of the screen.

Conclusions

The studies found that the microwave plasma generators should be installed so that the ignition of the fuel mixture is carried out in the plane circles Villars. The physical processes of interaction of the plasma torch with an external magnetic field that allowed the development of the design of the plasma torch.