СЕМИНАР
INNOVATIVE TRENDS FOR MODERNIZING ENGINEERING IN THE AGE OF GLOBALIZATION

EXTRACTION OF THE THERMONUCLEAR ENERGY

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Annotation

The problem of the energy shortage requires new methods of the energy generation. The explosive deuterium energetics based on the thermonuclear fusion is one of them. In the paper the new theoretical method of energy generation with small thermonuclear explosions in a special building, which was considered by *Russian scientists in «The explosive deuterium energy» is analyzed.*

Key words: deuterium, thermonuclear fusion, flare combustion boiler, explosive deuterium energetics, thermonuclear explosion, energy shortage, theory.

Introduction

One of the most important problem of the XXI century is shortage of energy. Modern energy sources provide the humanity needs, but generation of energy is still very expensive and has a bad influence on the environment. Lack of the basic energy sources such as coal and oil makes the humanity search the new, available and environmentally friendly sources of energy. Due to this fact the mature economies started to introduce some technologies for reducing energy consumption. In the last quarter of the XX century the application of some special technologies in the industrial production of the other national economies helped to halve energy consumption in America and Germany.

Despite this, the future development of the countries requires more and more energy. The developed countries started to compete for the last stocks of the energy sources. Limited reserves of the basic energy sources such as coal and oil make the humanity search the new, available and clear sources of the energy.

Thermonuclear explosion is one of the alternative eco clear energy sources. It is the source of energy which humans have not controlled yet. Nowadays the controlled thermonuclear fusion has not applied in industry because of the serious technological problems. One of the problems is a process of tritium mining, which does not exist in nature. In this article the theory of the uncontrolled thermonuclear explosion as a solution of the energy shortage problem is presented.

Objectives:

•To analyze ways of application the thermonuclear technologies for industrial generation of energy.
•To attract the attention of young specialists to research work in the field of application of the thermonuclear technologies.

Tasks:

•To make an analytical review of literature.

•To analyze the technologies, which have already been used in to produce the thermonuclear energy.

Development

Deuterium is an isotope of hydrogen with two neutrons in the core. It is an environmentally friendly, cheap, available and unlimited fuel, as it can be obtained from water. The amount of energy obtained with thermonuclear fusion from 1 kilo of deuterium is equivalent to the amount of energy obtained from 104 tons of oil. The idea of the explosive deuterium energy is based on getting energy from the explosions of special «energy charge».In this paper the method of generating thermonuclear energy, offered by Russian scientists in «The explosive deuterium energy», is considered. [1]

[1]

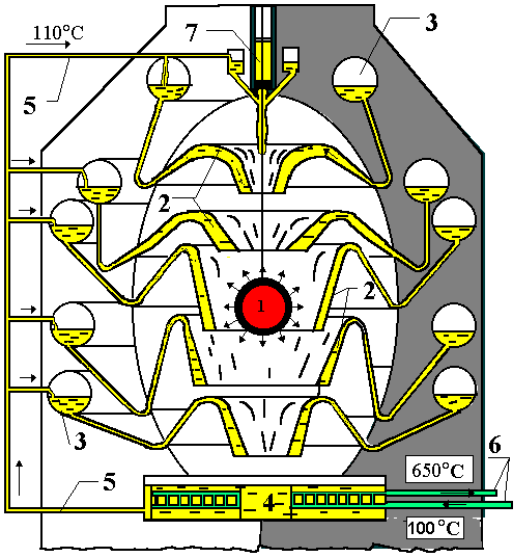
However the using of explosive technologies for peaceful purposes is not new. The small explosions of the patrol in the engine of internal combustion make the car move. The nuclear explosions for the autopsy soil and oil exploration were widely used in the USSR in the second part of the XX century. [2]

There are the special flare combustion boilers(FCB) which are supposed to produce energy from the thermonuclear explosions. The calculation of the construction of BFC is based on the great experience obtained from the underground nuclear tests.

The boiler of the flare looks like a big reinforced concrete barrel 150 meters in diameter, 250 meters in height. The walls are 35 meters thick and they are covered with the 20 centimeters steel layer. The boiler is strewn under the hundreds meters of the ground. It is possible to get 37 gigawatt of the thermal energy every half an hour in pulse mod with the deuterium explosions equivalent to 10 kilotons of the TNT. It is equivalent to approximately 25 million tons of oil.

The energy and the impulse of the thermonuclear explosion are absorbed by the falling layers of the liquid sodium and after that there is a process which is the similar to that at the nuclear stations. According to the calculation the boiler will produce over 2 million kilowatt electrical and 4 million kilowatt of thermal power every half an hour with the explosions of the charges in 3 kilotons of TNT equivalent. Theoretically every BIC will pay for itself in one or two years and will serve for over 50 years.

The veil of liquid sodium provides the heat exchange and helps to protect the steel layer from the blast wave and eradiation. An average temperature of the sodium will be over 550 degrees centigrade. The temperature after each explosion will increase by several tens times and will fall with heat exchange. Sodium must be separated from the radioactive unreacted materials, the parts of the explosed charges, fission fragments, and then it has to be returned to the fuel cycle. The thorium and uranium blankets may be irradiated with the thermonuclear neutrons for reproduction of fissionable materials.



Pic2. The theoretical scheme of the flare combustion boiler

1 – blast wave, 2 – protective wall of the falling sodium, 3 - balloons with the cold sodium(50 C), 4 - the sodium heat transfer agent, 5,6 – the first and the second outlines of the heat exchange, 7 - the elevator for the dawn of the energy charge

The detonation of the deuterium charges is to done with the energy from the fission chain reaction of less than 100 grams of U-233 or plutonium. It is possible to create more fissionable material with the strong thermonuclear neutrons in a special blanket Th/U than it is necessary for the detonation.

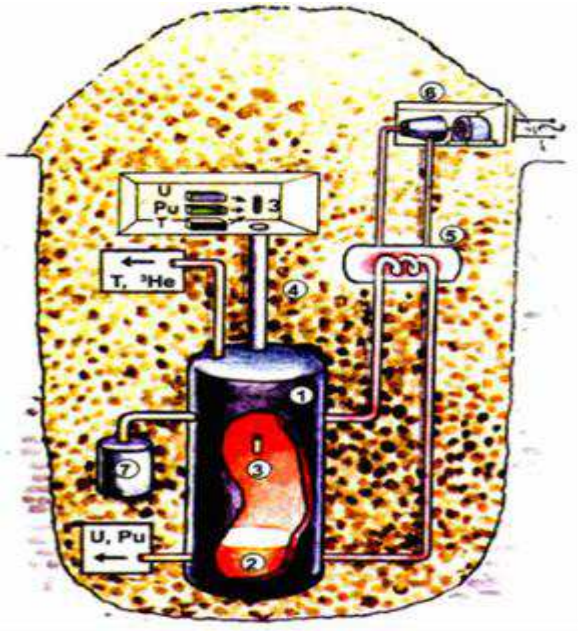


Fig 1. The technological scheme of the energy generation cycle in the FCB

The technological process of electricity production in FCB may be presented as a scheme as it is shown on Fig. 2. A few ten thousand tons of the liquid sodium 2) is put into the steel boiler 1). The charge 3) is made from several parts and put dawn through the special channel 4). After the explosion the liquid sodium comes to heat exchanger 5) where the water steam under the great pressure is produced. The steam turns the turbine 6), which is connected with the electrical generator. There is a special room 7) for the fragments from the fission. Unreacted fuel (U, Pu) and also the products of the reaction (H-3, He–3) are getting to the recast.

Nowadays the idea of the industrial application of BFC is far from its implementation. It is presented only in theory and it has a lot of technological problems, however, not long ago nuclear a station was just a project.[3]

Conclusion

The construction of one BFC will cost about 600 million dollars and expenses on the explosion control will be about 150 million dollars/kiloton, which doesn't include the cost of technological equipment (its cost is proportional to generated power). At first there was an idea of FCB construction with energy of explosion from 10 to 50 kilotons, but now BFC with power of explosion of 100 kilotons seems to have more advantages. Presented idea of energy generation from thermonuclear explosions, if implemented, stands a good chance to solve the problem of energy shortage in the world. Hypothetically, FCB also can be used for radioactive wastes disposals from the nuclear station, bacteriological and chemical weapon.[3]

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