International Journal of Emerging Engineering Research and Technology
Volume 2, Issue 3, June 2014, PP 168-170
ISSN 2349-4395 (Print) & ISSN 2349-4409 (Online)

Nano Nuclear Reactor

Prashant Kumar

IEC College of Engineering and Technology, India
prashantk2k13@gmail.com

Abstract: *A nuclear reactor is a device used to initiate and control a sustained nuclear reaction. Nuclear reactors are used in power plants for Electricity Generation. Nuclear power reactor uses a fuel known as Uranium. Uranium based nuclear reactor has several disadvantages like nuclear accident, radioactive wastes, high cost, impact on aquatic life etc. In the coming time from 2020-2040, we will need a practically unlimited energy source that can solve the global energy crisis. Keeping in mind the compact size, energy need and the disadvantages related with the Uranium based reactor, I had made an effort to overcome these problems by creating a wafer of mono atomic arena which will safer than present nuclear reactor and will provide vast energy to meet the need.*

Keywords: *Compact Size, Energy Crisis, Mono Atomic Arena, Nuclear Accident.*

1. INTRODUCTION

HERE we are going to discuss about a safe and feasible energy source by using radioactive atoms and creating a wafer of monoatomic arena. These types of reactors are much safer than the traditional heavy reactors which require protection from high energy gamma radiations using lead and concrete walls of several feet. Also they need to be cooled as they deliver heavy amount of thermal energy leads to use high level coolant such as heavy water and other non-renewable materials.

Overall this paper is divided into five sections namely; Mechanism of nuclear reactor, Heat generation, Coolant used in reactors, Monoatomic arena and Advantage of using such reactors.

2. MECHANISM OF NUCLEAR REACTOR

When a large fissile atomic nucleus such as Uranium-235 absorbs a neutron, it may undergo nuclear fission. The heavy nucleus splits into two or more lighter nuclei, (the fission products), releasing kinetic energy, gamma radiation and free neutrons. A portion of these neutrons may later be absorbed by other fissile atoms and trigger further fission events, which release more neutrons, and so on. This is known as a nuclear chain reaction.

To control such a nuclear chain reaction, neutron poisons and neutron moderators can change the portion of neutrons that will go on to cause more fission. Nuclear reactors generally have automatic and manual systems to shut the fission reaction down if monitoring detects unsafe conditions.

3. HEAT GENERATION

The reactor core generates heat in a number of ways:

A. The kinetic energy of fission products is converted to thermal energy when these nuclei collide with nearby atoms.

B. The reactor absorbs some of the gamma rays produced during fission and converts their energy into heat.

C. Heat is produced by the radioactive decay of fission products and materials that have been activated by neutron absorption. This decay heat source will remain for some time even after the reactor is shut down.

A kilogram of Uranium-235 converted by nuclear processes releases approximately three million times more energy than a kilogram of coal burned conventionally (7.2×10^{13} joules per kilogram of uranium-235 versus 2.4×10^{7} joules per kilogram of coal).

The energy released in the fission process generates heat, some of which can be converted into usable energy. A common method of harnessing this thermal energy is to use it to boil water to produce pressurized steam which will then drive a steam turbine that turns an alternator and generates electricity.

4. COOLING

A nuclear reactor coolant is usually water but sometimes a gas or a liquid metal (like liquid sodium) or molten salt is circulated past the reactor core to absorb the heat that it generates. The heat is carried away from the reactor and is then used to generate steam. Most reactor system employs a cooling system that is physically separated from the water that will be boiled to produce pressurized steam for the turbines like the pressurized water reactor. But in some reactors the water for the steam turbines is boiled directly by the reactor core, for example the boiling water reactor.

5. MONO ATMOIC ARENA

Today we are facing many problems such as destruction of nuclear reactors by some natural calamities. So we need a much more compact and efficient reactors which can be used anywhere to a vast field comprising of industries and low cost energy production. This type of reactors will be safe to use because of very less radiations. It will also release lots of energy in the form of heat which can be further use for the production of electricity.

We can create such type of nuclear reactor by using simple principle of nanotechnology. According to my research work we can create a two dimensional layer of atoms which can make to perform nuclear fission by increasing temperature. Another layer is completely defined for energy absorption that will be produced by nuclear fission reaction. By arranging both these layer above each other so that one performs the fission phenomenon and other absorbs the radiated energy and deforms completely from its layer arena.

When the absorption layer absorbs energy it vanishes and the layer for new reaction gets created. This chain reaction now performs in layer wise reactions which will be temperature dependent. It means the chain reaction can be controlled by controlling the temperature.

So here we are going to initiate only one atom or cluster at a time. After use of one layer and terminating the fission reaction, a new reaction will be start from the fresh end.

6. ADVANTAGE OF SUCH REACTOR

This type of reactor doesn't produce any sort of radioactive radiations. It completely nullifies the threat of radioactive leakage and danger of radiation.

As discussed earlier that a normal nuclear reactor requires coolant to carry away the large amount of heat produced but this reactor doesn't require any coolant.

The energy need can be fulfilled anytime in any sort of conditions.

This type of nuclear reactor is benefitted for small cities and remote areas.

7. CONCLUSION

The use of such reactors can fulfill the energy consumption at small scale. The losses occurs during transmission of power to the users can be avoided. This type of reactors can be planted to any secure place for desired time and power production.

Acknowledgement

The author would like to acknowledge the support provided by the professors of his college.

REFERENCES

[1] W. H. Stevenson, Global Nuclear System. New Delhi, India, 2007.

[2] A. K. Pandey, Energy Strategy. New Delhi, India, 2011.

AUTHOR'S BIOGRAPHY

Prashant Kumar (born. 1992-) is currently pursuing his Bachelor's Degree in Electrical Engineering from IEC College of Engineering and Technology, Gautam Budh Nagar (India). His first research paper entitled "Modification in element of Power System to improve its Efficiency " got published in IJSER in December, 2013. At present, He is working on Generation of electricity from flue gases.