CONSERVATION OF ENERGY

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Conservation of energy states that the total amount of energy in an isolated system remains constant. In thermodynamics, the first law of thermodynamics is a statement of the conservation of energy for thermodynamic systems.

The energy conservation law is a mathematical consequence of the shift symmetry of time; energy conservation is implied by the empirical fact that physical laws remain the same over time.

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With the discovery of special relativity by Albert Einstein, it was found that energy is one component of an energy-momentum 4-vector.

In quantum mechanics, energy is defined as proportional to the time derivative of the wave function.

RESEARCH OF NUCLIDE KINETICS FOR REACTOR FUEL

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During the operating time of nuclear reactor, there are a lot of nuclides with the different physical properties generated as fission products. Among these nuclides, there are some isotopes which have special characteristics and strong absorb neutron that affect to the physical properties of fuel assemblies. The investigation of the burnup processes that happen inside the reactor, especially the transmutation of U^{235} as well as other nuclides that formed in reactor is very important. By understanding this, the plant could be operated safety, prolonged the life time of reactor and reduced the nuclear wastes. [1]

This paper will present the research results of the nuclides transformation in fuel assemblies at the Tomsk research reactor [2] based on MCU Monte Carlo calculations [3].

In operating mode of reactor, the concentration of U^{235} will decrease by the burning-up process. But there are a lot of new nuclides formed as reaction products. To determine which nuclides significantly affecting to fuel assembly properties, it must be calculated the contribution of every individual isotope to the general absorbed reaction rate. There are 20 isotopes with the highest impact on the neutron-physical properties of fuel assemblies chosen to be researched: U^{235}, Xe^{135}, Nd^{143}, Sm^{149}, U^{236}, U^{238}, Pu^{239}, Rh^{103}, Pm^{147}, Cs^{133}, Xe^{131}, Sm^{151}, U^{234}, Tc^{99}, Sm^{152}, Nd^{145}, Pm^{148m}, Sm^{150}, Eu^{153}, Np^{237}, Pu^{240} and Mo^{95}.

Due to the calculations, the discrete concentration values for those isotopes had been received. By using the linear interpolation method to show the mathematical forms of every single isotope [4], the transmuted rules of above nuclides will be