POSTER SESSION

Transmutation Systems

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SUMMARY

In the poster session of transmutation system, all 18 papers were submitted. Many technical aspects related to transmutation system were described.

ITEP submitted 7 papers which are mainly related to accelerator driven system. They cover radiotoxicity and decay heat calculations of PWR spent fuels using Th, U and Pu. They also showed the calculation results of Pu, Am, Cu, Tc and I transmutation in ADS, and suggested some ideas for ADS.

B.R. Bergelson from ITEP presented changes of radiotoxicity and decay heat power of actinides from spent uranium and uranium-plutonium nuclear fuel of PWR-type reactors at long-term storage. In another paper, he presented the same changes from spent thorium-uranium nuclear fuel. A.S. Gerasimov from ITEP suggested the principal opportunity for development of a project for a Demonstration Transmutation ADS (DTADS) as an international collaboration in Russia. He also discussed the opportunity to use high thermal neutron flux for effective incineration of fission products and minor actinides. He analysed weapon-grade plutonium burning and transmutation of the americium and curium isotopes from spent fuel in reactor or accelerator-driven installations with various neutron fluxes and spectra. Finally, he discussed the design of ADS complex for transmutation of ^{99}Tc and ^{129}I. G.V. Kiselev from ITEP introduced ideas and suggestions related to ADS technology. They include broad range of topics such as accelerator, target, sub-critical blanket, sectioned blanket, necessity of high neutron flux, two blankets installation with fluid fuel etc.

Two other papers dealed with gas-cooled reactors and one paper dealed with the topic of molten salt. A. Baxter from General Atomics reported work on the development of two concepts using helium-cooled reactor technologies for transmutation. Both concepts make use of thermal and fast energy spectra. D. Ridikas from CEA discussed gas-cooled target and assemblies, and considered both fast and thermal sub-critical assemblies. It was suggested that the best features of both critical and sub-critical systems can be merged by combining the GT-MHR with an accelerator driven sub-critical assembly. V. Ignatiev from Kurchatov Institute reported molten salt reactor developed in the framework of the ISTC#1606. ISTC#1606 includes experimental study of the key properties of the selected molten salt fuel composition, experimental verification of structural materials and physics & fuel cycle considerations on molten salt reactor.

Five other papers related to ADS covered kinetics, sub-criticality measurement, fuels for Energy Amplifier, Pb-Bi coolant and comparison of neutron sources. Only one paper covered transmutation in a fast reactor. J. Blazquez from CIEMAT remarked the subtleties behind the questions related to ADS such as sub-criticality, spallation source, kinetic parameters etc. Y. Rugama from Universidad Politecnica de Valencia presented an absolute measurement technique for the sub-criticality determination based on the Stochastic Neutron and Photon Transport Theory. S. Kaltcheva-Kouzminova from Petersburg Nuclear Physics Institute presented neutronics calculations of the accelerator driven reactor core EAP-80 with UO_2 & PuO_2 MOX fuel elements and Pb-Bi coolant. A. Pena from ETSII e IT showed calculation results obtained by using two different CFD codes for Pb-Bi coolant in ADS. It shows that Pb-Bi coolant circulation by buoyancy forces is an important result. M. Dahlfors from Uppsala University showed a preliminary comparative assessment relevant to the transmutation efficiency of plutonium and minor actinides. It has been performed in the case of ANSALDO's Energy Amplifier Demonstration Facility with two different neutron sources. A.V. Lopatkin from Research and Development Institute of Power Engineering introduced RDIPE's work on a concept of a fast lead-cooled reactor with UN-PuN fuel (BREST series).

The other two papers are related to comparison of BR2 and MYRRHA in transmutation characteristics, and usage of ADS for proliferation creation of MOX fuel. Ch. De Raedt from SCK•CEN presented the performances of the high flux materials testing reactor BR2 and compared them with those of the ADS prototype MYRRHA in its present development stage. Finally, V.B. Glebov from MEPhI evaluated the potential of the accelerator driven systems for enhancing the proliferation resistance of LWR MOX fuel. ^{232}U is added to the MOX fuel and irradiated in the ADS blanket to create the inherent reaction barrier.