Contribution ID: **9** Type: **not specified**

Modern g,d,p,n-Induced Activation-Transmutation Systems

Friday 4 June 2010 10:00 (20 minutes)

The European Activation System (EASY) includes as the source of nuclear data the European Activation File (EAF) and as its engine the FISPACT activation-transmutation code. The latest version of the EAF, EAF-2010, contains cross section data for gamma-, deuteron- and proton-induced reactions in addition to the traditional neutron-induced data. The main reason for the addition of these data to EAF is to enable activation-transmutation calculations to be performed for even more nuclear facilities, including 'accelerator'driven devices with incident upper energy limit of 60 or 200 MeV. EAF-2010 has benefited from the generation and maintenance of comprehensive activation files in the past and the development of the processing code SAFEPAQ-II and model code TALYS. TALYS is the source for all gamma, proton and deuteron induced data and a fair share of the neutron-induced data. Cross section validation exercises against both experimental data and systematics, which were started in 1995, enable a comprehensive assessment of the data. Although EAF-2010 is certainly the most-validated activation neutron cross section library in the world, currently less than 3% of all the reactions can be compared with experimental information, and even then only for a very limited, and not always application-relevant, energy range. As with EAF-2001, -2003 2005 and 2007 results of integral experiments have been used to correct, adjust and validate data. This can be done using SAFEPAQ-II by inputting the measured effective cross sections. Validation using integral data has been performed by means of direct comparison with measurements of various materials under relevant particle spectra. A tool has recently been developed which is important now that the libraries contain so much TALYS-calculated data. Statistical Analysis of Cross Sections (SACS) is used to look for trends in the library data for a particular reaction type and this has proved efficient in identifying reactions with data that need correction or improvement. This method has been used with EAF-2005 and EAF-2007 and is a valuable additional validation method. However, the time has come to rethink the nuclear data generation processes alongside the transport-activation-transmutation code systems. A new approach is proposed that encompasses 25 years of research activities which can now be mobilised to fulfil the needs, using a much more systematic and automated approach. For the first time, all existing experimental data and nuclear models for all relevant materials can together be transferred to technology in a consistent manner. In this process, feedback of extensive validation and benchmark activities would automatically be taken into account.

Author: Dr SUBLET, Jean-Christophe (Culham Centre for Fusion Energy)

Co-authors: Dr KONING, Arjan (Nuclear Research and Consultancy Group (NRG)); Dr ROCHMAN, Dimitri (Nuclear Research and Consultancy Group (NRG)); Dr KOPECKY, Jura (JUKO Research); Dr PACKER, Lee (Culham Centre for Fusion Energy)

Presenter: Dr SUBLET, Jean-Christophe (Culham Centre for Fusion Energy)

Session Classification: Session 6 - Present status of data and code libraries

Track Classification: Present status of data and code libraries