Summary and Recommendations for Development of Transport Capability : Thick Target Physics

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THICK TARGET BENCHMARK DISCUSSIONS

The final date for additional contributions of LAHET-LANL and FLUKA-CERN/Milano and NMTC-JAERI is August 1, 1994. All contributors were asked to provide revised program descriptions and flow charts of the used code systems. Also the used neutron- gamma transport libraries below 20 MeV should be specified in more detail. For HETC users it will be sufficient to describe the differences of the used version as compared to the original one (see T.W. Armstrong, K.C.Chandler, Nucl. Sci. Eng. 49,110,1972).

AVAILABLE CODE SYSTEMS FOR THICK TARGET CALCULATIONS

The subgroup recommends the following code systems for thick target calculations. The HERMES/kfa, LAHET-MCNP/lanl, CALOR/ornl and the code used at PSI are available with detailed documentation from NEA or RSIC. Other codes should also be made available through NEA. The FLUKA/cern - Milano version a new version suitable for spallation source and ATW applications and the other mentioned systems as SHIELD/inr, SITHA/dubna, and SOURCE/ansaldo should be also made available through NEA with a detailed documentation.

CODE ENHANCEMENTS

It was the groups opinion, that enhancements of the code systems are not feasible for the time being with respect to spallation source or ATW applications, as the known measurements do not give unique hints concerning the systematics of cross sections with respect to mass number, angle and energy. For spallation source and ATW applications single deficiencies from measurements can be tolerated. For special applications (e.g. medical treatment) a data library generation in the energy range up to 250 MeV using preequilibrium models such as those within the codes ALICE, GNASH, FKK-GNASH, or MINGUS could be useful.

HIGH ENERGY NEUTRON TRANSPORT LIBRARIES FOR SHIELDING APPLICATIONS

The following existing group cross section libraries - HILO86/400MeV, LANL/800MeV and LAHI-KFA/2.8 GeV should be made available through NEA.These libraries are foreseen to be used with deterministic codes. All libraries are based on HETC calculations above 20 MeV and on ENDF/B below.

THICK TARGET BENCHMARK EXPERIMENTS

A number of thick target benchmark experiments were recommended as benchmarks for the transport code systems. All data and descriptions of these experiments should be made available through NEA.

A list of these experiments follows:

COSMOTRON/FERFICON-LANL/Chalk River,
SUNNYSIDE-LANL, Stop Targets-LANL,
Vassilkov experiments/see ICANS-XI,1990,
Shielding experiments at beam stops at PSI and LANL,
Japanese review of shielding experiments/Ref. Arlington meeting,
Energy deposition and target heating/LANL-LANSCE and ANL/RAL spallation sources.

Some additional experiments are underway or in preparation at the Moscow Meson Facility and at SATURNE in Saclay.

RADIONUCLIDE DECAY CALCULATIONS

Two codes and libraries in this field should be made available through NEA, namely ORIHET/PSI and CINDER90/LANL.

REQUEST FOR FURTHER THICK TARGET BENCHMARKS

There was a discussion for a further thick target benchmark. The opinion was to discuss this after the code comparison of the thick target benchmark is finished. This should be a benchmark for some good documented and precise thick target experiments, e.g. COSMOTRON etc. .

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