OECD
DOCUMENTS

INTERMEDIATE ENERGY NUCLEAR DATA: MODELS AND CODES

PROCEEDINGS OF A SPECIALISTS' MEETING ISSY-LES-MOULINEAUX (FRANCE) 30 MAY-1 JUNE 1994

PUBLISHER'S NOTE

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium,Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973) and Mexico (18th May 1994). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full Member. NEA membership today consists of all European Member countries of OECD as well as Australia, Canada, Japan, Republic of Korea, Mexico and the United States. The Commission of the European Communities takes part in the work of the Agency.

The primary objective of NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.

This is achieved by:

- *encouraging harmonization of national regulatory policies and practices, with particular reference to the safety of nuclear installations, protection of man against ionising radiation and preservation of the environment, radioactive waste management, and nuclear third party liability and insurance;*
- *assessing the contribution of nuclear power to the overall energy supply by keeping under review the technical and economic aspects of nuclear power growth and forecasting demand and supply for the different phases of the nuclear fuel cycle;*
- *developing exchanges of scientific and technical information particularly through participation in common services;*
- *setting up international research and development programmes and joint undertakings.*

In these and related tasks, NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has concluded a Co-operation Agreement, as well as with other international organisations in the nuclear field.

Foreword

This specialists' meeting was organised as a follow-up to the recent report by the NEA Nuclear Science Committee entitled *International Code Comparison for Intermediate Energy Nuclear Data,* which addresses the subject the of codes and models used to calculate nuclear reaction processes from 20 to 1600 MeV. This effort is part of the programme of work of the Agency in the area of partitioning and transmutation of radioactive waste from the nuclear industry.

Two benchmark exercises had been organised by the NEA. The results of the first one on microscopic nuclear reaction calculations (thin target) were published prior to the meeting. The second exercise, on transport calculations (thick target), is still in progress. The objective of the study is to help determine the predictive capacity of current nuclear reaction and transport codes for future design concepts for transmutation as well as for other application areas, such as radiation oncology, accelerator shielding, astrophysics, radiation during space travel, etc.

The purpose of the meeting was to bring together the participants in the intercomparison exercises to:

a) discuss the relative merits and deficiencies encountered in the use of various codes and models throughout the world,

b) issue recommendations for future developments in codes and identify intermediate energy data needs, both experimental and evaluated.

Published on the responsibility of the Secretary-General, this report does not necessarily reflect the views of the national authorities of the OECD countrie
s concerned.

Note by the Editor :

Corrigendum to results published in the OECD report entitled:

International Code Comparison for Intermediate Energy Nuclear Data
OECD, Paris, 1994.

GEANT/FLUKA results

The NEA code comparison critiqued in these proceedings was fortunate in having a contribution from College de France utilising the GEANT 3.15 code, which is very widely used in the physics community. This code contained an interface to the code FLUKA. The interface used is relevant to energies considerably in excess of those of this exercise, so it was interesting to see that it still did reasonably well for the examples considered. Since the time the intercomparison was performed, much of the full FLUKA code has been incorporated into release GEANT 3.21. The full FLUKA code, including the PEANUT module relevant to intermediate energies, is presently being installed in GEANT. We therefore include results from the full FLUKA code for the intercomparison cases of our exercises, illustrating the capability of the code to be released shortly in GEANT, which has long been available in the stand alone FLUKA code.

LAHET results

The above mentioned report included LAHET calculations performed with incident neutrons. Revised calculations using incident protons are included in the present report.

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