

A Computerized Energy Systems Code and Information Library at Soreq *†

I. Silverman, M. Shapira, M. Caner and D. Saphier
Soreq - NRC, Yavne 81800, Israel.

Introduction

In the framework of the contractual agreement between the Ministry of Energy and Infrastructure and the Division of Nuclear Engineering of the Israel Atomic Energy Commission, both Soreq-NRC and Ben-Gurion University have agreed to establish, in 1991, a code center. This code center contains a library of computer codes and relevant data, with particular emphasis on nuclear power plant research and development support.

The code center maintains existing computer codes and adapts them to the ever changing computing environment, keeps track of new code developments in the field of nuclear engineering, and acquires the most recent revisions of computer codes of interest. An attempt is made to collect relevant codes developed in Israel and to assure that proper documentation and application instructions are available. In addition to computer programs, the code center collects sample problems and international benchmarks to verify the codes and their applications to various areas of interest to nuclear power plant engineering and safety evaluation.

Recently, the reactor simulation group at Soreq acquired, using funds provided by the Ministry of Energy and Infrastructure, a PC work station operating under a Linux operating system to give users of the library an easy on-line way to access resources available at the library. These resources include the computer codes and their documentations, reports published by the reactor simulation group, and other information databases available at Soreq. Registered users set a communication line, through a modem, between their computer and the new workstation at Soreq and use it to download codes and/or information or to solve their problems, using codes from the library, on the computer at Soreq.

*Paper submitted to the 19th Annual Conference of the Israeli Nuclear Societies. Herzelia, Israel. December 9-10, 1996.

†This work was partially supported by the Ministry of Energy and Infrastructure.

This paper presents some of the codes and information databases available for the users of the Energy Systems Code and Information Library and the methodology to make a connection.

Making a connection

The new communication mechanism which enables the user a direct access to all resources available at the library is open for registered users. After a user gets permission to use this communication method he should provide information regarding the computer and operating system he uses and the telephone number to which his modem is connected to. For security purposes, a call-back mechanism is used where whenever a user wants to make a connection he makes a call (through his communication software) to the number of the workstation of the library and provides his user ID and password. After a verification process, the connection is closed and the workstation of the library makes a call back to the telephone number which was given by the user at the time of registration. The user modem and computer should be able to get this call and to enter into a communication mode. The library is able to provide or to recommend on hardware and software suitable for this communication method. After a communication line is set the user may download the codes and information he needs or use the codes on the computer of the library.

Computing environments

The ever changing computing world, the development of new types of computers (mainframes, workstations and personal computers (PC)) and operating systems (IBM VM-CMS for mainframes, UNIX for workstations and UNIX and/or DOS/Windows for PCs) with higher capabilities and new communication technologies like networks and the Internet motivate and require adaption and revision of the codes for these new technologies and computing systems. Most computer codes mentioned here have been developed for and are available from Soreq (usually old versions only) for mainframes operating under the IBM VM-CMS system. This configuration is referred to as configuration number 1 in the following lists of codes and databases.

The reactor simulation group at Soreq uses for some years a IBM RS/6000 computer operating under the AIX system which is a flavor of standard UNIX (configuration no. 2) and PCs with DOS/Windows operating systems (configuration no. 3). The group started recently to use PCs with the Linux operating system which is another, public domain, flavor of UNIX (configuration no. 4). Most of the codes which have been found useful and are used by the staff of the simulation group at Soreq have been ported to these two new systems.

The expertise developed in the group for this porting work are available for any new porting project as required.

Codes list

The following codes are currently available at Soreq:

WIMS-D4 (NEA0329) A code for lattice calculations. It has its own fine group cross section data library, based on pre-1976 experimental data. The code is used at Soreq and available for all configurations.

CITATION (NESEC0387) A full core diffusion code for neutronics calculations. It can treat up to three space dimensions in Cartesian, cylindrical, hexagonal-z and trigonal-z configurations. The code is used at Soreq and available for all configurations.

COBRA-4I (NESEC0659) A thermal-hydraulics code for steady-state calculations as well as flow and enthalpy in rod bundle nuclear fuel element subchannels during transient conditions. Boiling and non-boiling conditions are included, as well as cross-flow mixing. The code is used at Soreq and available for configurations 2, 3 and 4.

DSNP A thermal-hydraulic and neutronics code which has been developed and is maintained at Soreq. The code is used at Soreq and available for all configurations.

Other codes available at Soreq are listed in [1].

Databases

The following databases are currently available at Soreq:

International Handbook of Evaluated Criticality Safety Benchmark Experiments

A digital version of this handbook of the Organization for Economic Co-Operation and Development (OECD) together with the software needed to browse through it is available.

NEA Data Bank, Nuclear Program Abstracts The June 1996 version of this database from OECD, together with the software needed to browse through it is available.

Other databases available at Soreq are listed in [1].

Conclusions

Using modern technologies, the Energy Systems Code and Information Library at Soreq, is working to provide better and easier ways for its users to access the resources available from the library. Recently, the reactor simulation group at Soreq acquired, using funds provided by the Ministry of Energy and Infrastructure, a PC work station operating under a Linux operating system to give users of the library an easy on-line way to access resources available at the library.

These resources include the computer codes and their documentations, reports published by the reactor simulation group, and other information databases.

The expertise developed in the reactor simulation group at Soreq to port computer codes from one computation environment to another and to revise them to use new technologies are available for any new porting project as required.

We would like to extend the collection of computer codes relevant to nuclear engineering and of relevant databases which is available at the library. We would appreciate contributions from members of the Israel Nuclear Societies, and other, of any new code which they think is of interest for other people.

References

- [1] M. Caner and D. Saphier. The energy systems code library. Technical Report RASG-164-92, Soreq Nuclear Research Center, 1992.