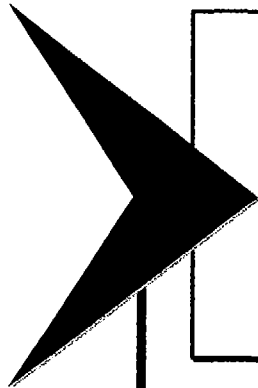




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Graphical User Interface Simplifies MCNP Use and Provides Burnup Capabilities



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Research Reactor Analysis Program (RRAP)

Overview

- **Provides MCNP interface**
- **Based on Object-Oriented Programming**
- **Substantial work leading up to RRAP**
- **Models are very detailed**
- **Simplifies data management for burnup calculations**
- **Demo / Results**

Looking for candidates interested in development of RRAP versions for other reactor types

RRAP's MCNP Features

- **Customized for each facility's reactor geometry**
- **Allows geometry and/or material changes via a graphical interface**
 - **move rods around**
 - **optimize irradiation facilities**
- **Builds full core MCNP input model (fully commented)**
- **Retrieves data from output file, then processes and stores it (typical run may bring in over 1,000 values)**
- **Provides a variety of calculation results**
 - **excess reactivity**
 - **flux spectra in irradiation facilities**
 - **3-D burnup in fuel**
 - **activation levels in samples**

RRAP History

- **Five years ago, funded by U.S. Air Force for Space Reactor Design Optimization**
- **In 1992 AAI recieved funding to develop the Detailed Reactor Analysis Code (DRAC) that allowed optimization of four types of thermionic space reactors**
- **In 1993 AAI started modification of DRAC to make RRAP**
- **Currently there are three TRIGA facilities successfully using RRAP**
- **Ready to expand to other Research Reactor types**

MCNP Model Details

- **Full core models**
- **Includes all beam port holes in reflector regions**
- **3-D description of fuel in the core**
- **Ability to adjust control rod positions independently**
- **Typical input file ~2500 lines**
- **burnup rates are calculated in five axial locations for each rod**
- **Tracks fuel inventory for every rod in the reactor and in storage**

MCNP Burnup

- **MCNP can provide very good reaction rates**
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- **These rates along with a given time step leads to very good burnup data**
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- **Current methods under review by LANL**
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- **MCNP not traditional burnup code due to large amount of manual data manipulation required**
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- **Solved by RRAP**

