MONK® Nuclear Criticality Safety

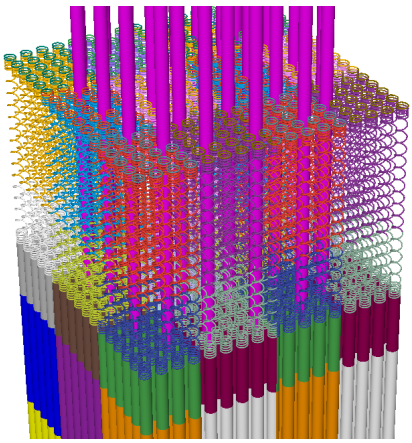
MONK® is an advanced Monte Carlo software tool for nuclear criticality safety and reactor physics analysis.

The Software

MONK®'s advanced geometry modelling and detailed continuous energy collision processing provide realistic 3D models for an accurate simulation of neutronic behaviour. MONK®'s superhistory algorithm provides robust and reliable estimates of the neutron multiplication factor, k-effective, and other parameters of interest, even for systems which are challenging for other codes. MONK® is developed with a strong user focus, ensuring that it is powerful, flexible and easy to use.

Nuclear data libraries exist for MONK® from a variety of sources including JEFF, ENDF/B, CENDL and JENDL. The most accurate representation of the nuclear physics is provided by a continuous energy representation of the data, with runtime Doppler broadening for highly accurate temperature representation. Data are also available in hyperfine group format and, for reactor analysis, multigroup format. A depletion capability is available with both multigroup data and continuous energy data with intuitive support for burnup credit analyses.

Validation is of prime importance for a criticality code, and the MONK® package contains a large set of centrally-maintained validation data, drawing heavily on experiments in the International Criticality Safety Benchmark Evaluation Project (ICSBEP) handbook. Support in the use of the code and its application is available from our dedicated help-desk, providing direct access to our criticality, reactor physics and shielding expertise.

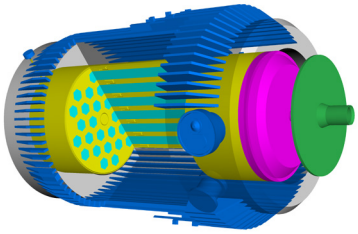


PWR fuel assembly modelled in MONK®

Strong Customer Focus

ANSWERS® has a strong global customer base, with clients in more than 30 countries around the world, including the USA, China, Japan and across Europe.

Interaction with our customers, understanding their requirements and listening to their feedback, is an important part of our mission to continuously develop and improve our software.



3D ray trace view of a spent fuel transport cask.

Benefits

- Unrivalled geometry modelling capability, including native tracking in CAD geometries and a range of stochastic geometry models, for optimum accuracy.
- A rich, powerful, easy to use input syntax.
- Recognised as an effective and reliable analysis tool in safety case submissions to regulators.
- Nuclear data libraries are available to support international needs and to provide valuable cross-checking capabilities.
- Access to dedicated hotline support, by telephone and e-mail.
- Access to regular training courses with bespoke/on-site training available.

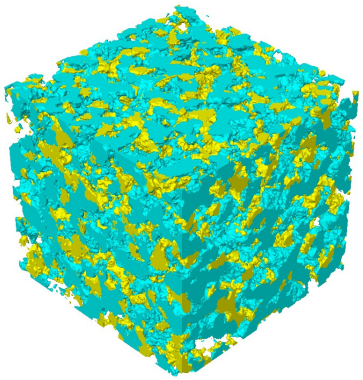
Model Verification Code

Model verification is a key part of computer code usage and the Visual Workshop tool provides sophisticated options to assist the MONK® user. These include a wireframe view of the geometry components, and detailed 2D and 3D raytrace views of the geometry drawn using the actual geometry tracking routines of MONK®, a powerful QA feature which ensures that the displayed images represent the true MONK® geometry. The model views are fully interactive, allowing zooming, panning, rotating, material identification, and cutaway views. In addition to displaying models for verification, Visual Workshop is a fully-featured integrated development environment within which users can edit model inputs, run models, display results on the geometry, and run analysis tools for validation, uncertainty quantification and optimisation.

MONK® Applications

MONK® has been successfully used in support of the design and operation of a wide range of nuclear facilities covering the complete fuel cycle. Selected examples include:

- Uranium enrichment covering diffusion and centrifuge plant.
- Fuel fabrication for thermal, fast and experimental reactors.
- New and spent fuel transportation both within countries and between countries.
- Design studies for fissile material transport containers.
- Spent fuel handling and long-term pool storage.
- Spent fuel dry storage.
- Fuel consolidation and dry cell handling.
- Fuel dissolution.
- Chemical separation involving mixer-settlers and pulsed-columns.
- Reactor core loading assessment.
- Product finishing and storage.
- Waste treatment and handling.
- Waste storage including evaporation, vitrification, encapsulation and consolidation.
- Plutonium metal production and handling.
- Reactor analysis for all thermal reactor types.
- Burnup credit analyses.



Heterogeneous mixture of three materials (the interstitial material removed for clarity) modelled in MONK® using Perlin noise.

Contact

If you would like more information about Amentum's ANSWERS® Software Service, please contact:

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