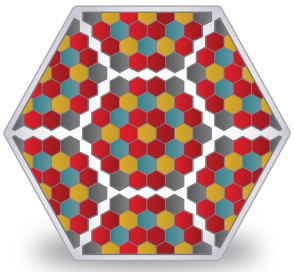
Studsvik

HELIOS2

NUCLEAR FUEL ANALYSIS SOFTWARE

Generalized-Geometry Lattice Physics Code

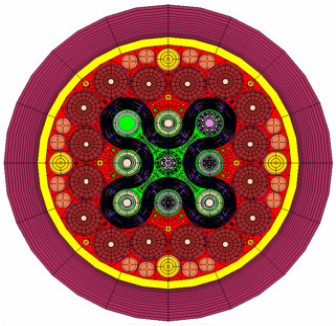
HELIOS2 is a two-dimensional, generalized-geometry lattice physics transport code. By including the latest nuclear data and substantially expanded modeling capability, HELIOS2 reaches far beyond the capabilities of previously available versions.



The Flexibility You Need

The generalized geometry and computational options in HELIOS2 allow the modeling of any imaginable fuel design. There are no restrictions on lattice or geometry types.

HELIOS2 is capable of analyzing fuel used in both conventional and non-conventional nuclear reactor designs. It can perform complex physics calculations for non-LWR lattices (CANDU, PHWR, Magnox, RBMK, etc.) and experimental reactors, like MTR and TRIGA.



HELIOS2 has also been used to analyze hundreds of cycles of VVER operation. Even non-standard fuel designs, such as curved plates and unstructured liquid or gas fuels, are easy in HELIOS2.

Improved Modeling Detail

Exploiting the power of today's computational hardware, HELIOS2 requires fewer approximations and performs more rigorous solutions than the previous generation of lattice physics codes.

The addition of a Method of Characteristics solver allows larger models, such as multiple fuel bundles and fractional cores, to be calculated with fewer required computing resources.

Accuracy

HELIOS2 has been extensively validated against measured critical experiments, continuous-energy Monte Carlo calculations, and international isotopic benchmarks. HELIOS2 delivers exceptional accuracy for traditional, non-traditional, and experimental fuel designs.

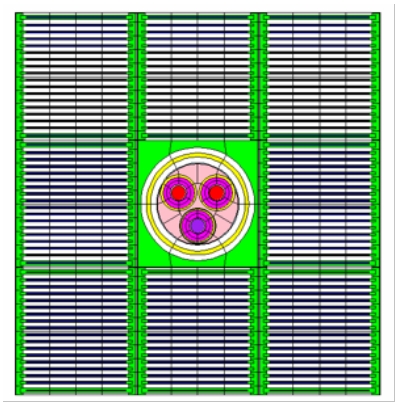
ENDF/B-VII: Toward Better Data

Using the most recent ENDF/B-VII nuclear data available, Studsvik has developed a high-resolution, 177-group neutron library for use with HELIOS2. This extensive update from the previous HELIOS library improves accuracy and enhances resonance treatments. HELIOS2 also includes an updated 48-group gamma library for gamma transport and smearing calculations. Cross-section data is available for over 350 nuclides and materials.

With data available for more than 175 fission products and 40 heavy nuclides, this library is state-of-the-art in every sense.

Ease of Use

The HELIOS2 system includes an interactive geometry rendering module to assist with input development.



Capable of displaying both the full system and individual components, this module displays geometry, material and temperature assignments, and edit areas, so you get your model right the first time. Input data sets can be written to the central database structure so that fixed or common data is centrally available without the need to re-enter data.

Database-Driven Design

Inter-module data communication is performed via a database structure, allowing calculation results to be easily archived and retrieved. This database architecture also supports simultaneous analysis of results from multiple cases and creation of burned fuel data banks for later use.

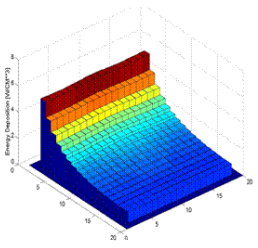
Methodology

HELIOS2 transport calculations may be performed with either a collision probabilities or Method of Characteristics solver. Resonance self-shielding is calculated via the subgroup method, with a transport-based Dancoff calculation.

Powered by a predictor-corrector depletion methodology, HELIOS2 provides for depletion paths with arbitrary state changes, generalized decay capabilities, and branch-off calculations.

Requirements For HELIOS2

Written entirely in Fortran-90, HELIOS2 is supported on all standard computing platforms running most modern 32- and 64-bit operating systems. Linux, Windows, and UNIX architectures are all acceptable environments for HELIOS2 software.



The output processing module allows edits to be manipulated, combined, and compared to results from other calculations and experimental data.

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