CONVERSION OF COMPUTER AIDED DESIGN (CAD) OUTPUT FILES TO MONTE CARLO N-PARTICLE (MCNP) INPUT FILES

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Overview

- Export 2D Drawing eXchange Format (DXF) files from CAD
  - Convert to MCNP using the MCNP Visual Editor
- Export 3D Standard ACIS Text (SAT) files from CAD
  - Convert to MCNP using the MCNP Visual Editor
Complete Interface for MCNP
The Visual Editor
Graphical User Interface for MCNP

- Display Geometries with 2D views
- Create geometries
  - Universes, fills, lattices
- Some support for data cards
  - Materials, transformations, importances
- Plot particle tracks
  - SDEF Source generation points
  - Collision points
  - KCODE source point generation
- 3D plots
  - Normal, Radiograph, Transparent
- Tally plots
How the Visual Editor works

- Visual C++ code is linked to the MCNP Fortran code.
- The Visual Editor Fortran modifications are now a part of the LANL Version 5 Fortran code.
- The C++ and Fortran share data and memory.
Visual Editor Capabilities
Lattice Display/Creation
Visual Editor Capabilities
3D Ray Traced Imaging
Visual Editor Capabilities
3D Plots of Lattice Geometries
Visual Editor Capabilities
Collision Plots
2D CAD conversion
Generate in CAD
Export as a DXF File
2D CAD conversion
Read 2D dxf File into Visual Editor
2D CAD conversion
Removed Unwanted Surfaces

Remove this ellipse
Using Scan-Delete
2D CAD conversion
Segment the surfaces

Segment the surface
2D CAD conversion
Convert to MCNP
2D CAD conversion Limitations

- Can not convert intersecting circles/ellipses
- All geometries are extruded axially
- Different geometries have same axial cross section
  - Axial cross section of a cylinder converts to a box.
  - Spheres convert to cylinders.
3D CAD conversion
Generate in CAD
Export as a SAT file
3D CAD conversion
Read SAT File into Visual Editor
3D View of CAD Geometry Displayed
3D CAD conversion
Convert to MCNP
3D CAD conversion
View MCNP Geometry in 3D
3D CAD conversion

Two Different Modes

- **Use CAD to Create the MCNP geometry.**
  - Define the geometry without using subtractions or unions
  - Conversion program will determine the subtractions and unions.

- **Read an already existing fully defined geometry**
  - All space must be defined
  - May need to simplify overly complex cells
Example 3D CAD conversion
Building
Example 3D CAD conversion

Building
Example 3D CAD conversion
Duct with 3 Bends
Request for Test Geometries

- Test 2D and 3D conversion on complex geometries.
  - Send geometries to Randy Schwarz

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