TRANSMGU, A MODEL GENERATION UTILITY CODE

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ABSTRACT

1. **Program Name and Title:** TransMGU, A Model Generation Utility Code.

2. **Computer for Which Program is Designed and Other Machine Versions Available:** TransMGU has been developed to be portable to any computing platform that supports the Fortran 90 programming language.

3. **Problem Solved:** TransMGU is a model generation utility for the TransFX, TransMED, CPM-3 and MCNP codes. TransMGU is an excellent tool for validating computer models by translating TransFX, TransMED, and CPM-3 models to MCNP models. The resultant MCNP models contain all inputs required for the performance of MCNP criticality calculations.

4. **Method of Solution:** TransMGU processes TransFX, TransMED, and CPM-3 input files and generates equivalent MCNP inputs. TransMGU performs the model conversion in stages. First, input combinatorial geometry bodies are decomposed into collections of MCNP surfaces. Complete MCNP cell descriptions, identical to the definitions of TransFX, TransMED, and CPM-3 solution regions, are then generated by appropriately intersecting or complementing the body/surface descriptions. TransMGU then processes all materials in the model, automatically converting all TransFX, TransMED, and CPM-3 nuclides to MCNP nuclides using an external translation file. Finally, fission and absorption rate tally cards for MCNP are generated based on the reaction rate maps defined in the TransFX, TransMED, and CPM-3 inputs. All MCNP cards required for performing criticality calculations in MCNP are generated automatically by TransMGU. Additionally, the PLOT function of MCNP can be used to visually display any TransFX, TransMED, and CPM-3 model converted by TransMGU.

5. **Restrictions on the Complexity of the Problem:** None noted.

6. **Typical Running Time:** Typical light water reactor fuel assembly models are generated within seconds.

7. **Unusual Features of the Program:** TransMGU incorporates advanced geometry and material handling features. Some of these capabilities include:
   - Arbitrary geometry modeling allowing the user to describe fuel assembly models of virtually any mechanical design and to any level of design detail.
   - Automatic calculation of cell volumes, temperatures, number densities, etc. for MCNP input.
   - Flexible generation of reaction rate maps for generating MCNP tallies.
   - Capability to read TransFX, TransMED, and CPM-3 input files.
   - Capability to visually display any TransFX, TransMED, and CPM-3 model using MCNP PLOT feature.

8. **Related and Auxiliary Programs:** TransMGU processes input files for the TransFX nuclear transport theory code, the TransMED medical physics transport code, and the CPM-3 lattice physics code and generates inputs for the MCNP Monte Carlo code.

9. **Status:** The latest release of TransMGU is dated July 1999. The code has been tested on UNIX and DOS/WINDOWS platforms.

10. **References:** W. J. Wilson, "TransMGU Computer Code Manual," TransWare Enterprises Inc., August 1999.

11. **Hardware Requirements:** A UNIX, Linux or Windows platform with a minimum of 64 MB of RAM and 100 MB of free hard disk space is recommended.

12. **Programming Language:** Fortran 90.

13. **Operating System:** UNIX, Linux and Windows systems.

14. **Other Programming or Operating Information or Restrictions:** A single optional C routine is included to retrieve CPU seconds.

15. **Name and Affiliation of Author or Contributor:** Dean B. Jones, TransWare Enterprises Inc., (408) 227-7700.

16. **Material Available:** TransMGU code and brochures describing the TransMGU code are available from TransWare Enterprises Incorporated.

17.   **Category**: L and N.

       Keywords: Lattice Physics, Arbitrary Geometry, Combinatorial Geometry, Model Conversion, Monte Carlo, MCNP.

18.   **Sponsor:** TransWare Enterprises Inc.