Computer Code Abstracts

TWOTRAN–II

1. Name of Program: TWOTRAN-II, an interfaced, exportable version of the TWOTRAN code[1] for two-dimensional transport.

2. Computer for Which Program is Designed and Others on Which It Is Operable: CDC 7600, CDC 6600, IBM 360/195.

3. Nature of Physical Problem Solved: TWOTRAN-II (Ref. 2) solves the two-dimensional multigroup transport equation in (x,y), (r,θ), and (r,z) geometries. Both regular and adjoint, inhomogeneous and homogeneous (k_{eff} and eigenvalue searches) problems subject to vacuum, reflective, periodic, white, or input specified boundary flux conditions are solved. General anisotropic scattering is allowed and anisotropic inhomogeneous sources are permitted.

4. Method of Solution: The discrete ordinates approximation for the angular variable is used in finite difference form which is solved with the central (diamond) difference approximation. Negative fluxes are eliminated by a local set-to-zero and correct algorithm. Standard inner (within-group) and outer iterative cycles are accelerated by coarse-mesh rebalancing on a coarse mesh which may be independent of the material mesh.

5. Restrictions on the Complexity of the Problem: Variable dimensioning is used so that any combination of problem parameters leading to a container array less than MAXLEN can be accommodated. On the CDC machines, MAXLEN can be slightly greater than 40 000 words and peripheral storage is used for most group-dependent data. On IBM machines, TWOTRAN-II will execute in the four-byte mode so that MAXLEN can be several hundred thousand (depending on local machine memory size) and most problems can be core contained. Detailed memory requirements are given in Ref. 2.

6. Typical Machine Time: A six-group, S_4, 42×42 mesh point, k_{eff} calculation of an EBR-II model requires about 3.9 min of CDC 7600 time. The same problem required slightly less time on the IBM 360/195.

7. Unusual Features of the Program: Provision is made for creation of standard interface output files for S_n constants, angle-integrated fluxes, and angular fluxes. Standard interface input files for sources, fluxes, cross sections, and S_n constants may be read. All binary operations are localized in subroutines called REED and RITE. Detailed edit options, including angular fluxes, dumps, and restart capability are provided. Optional use of an arbitrary rebalance mesh independent of the material mesh is allowed.

8. Related Programs: TWOTRAN-II is an improved version of the TWOTRAN program.[1] Users now having the general-geometry TWOTRAN program should consider the advantages of switching to TWOTRAN-II before expending the effort. Consultation with the authors is encouraged. Many comment cards were added and much simplifying programming was performed to make TWOTRAN-II as easy to understand as possible.

9. Status: In use.

10. Machine Requirements: Five output units, five interface units (use of interface units is optional), and two system input/output units are required. A large bulk memory is desirable, but it can be replaced by disk, drum, or tape storage.

11. Programming Language: FORTRAN IV. A major effort was made to remove nonstandard and installation-dependent usages.

12. Material Available: Source deck, test problems, results of executed test problems, and manual are available from the Argonne Code Center and the Oak Ridge Radiation Shielding Information Center.

13. *Acknowledgment*: This work was performed under the auspices of the U.S. Atomic Energy Commission.

14. *References*:

[1]K. D. LATHROP and F. W. BRINKLEY, "Theory and Use of the General-Geometry TWOTRAN Program," LA-4432, Los Alamos Scientific Laboratory (1970).

[2]K. D. LATHROP and F. W. BRINKLEY, "TWOTRAN-II: An Interfaced, Exportable Version of the TWOTRAN Code for Two-Dimensional Transport," LA-4848, Los Alamos Scientific Laboratory (1973).

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TRIPLET

1. Name of Code: TRIPLET: a two-dimensional, multigroup, *TRI*angular mesh, *PL*anar geometry, *E*xplicit *T*ransport code.[1]

2. Computer for Which Program is Designed and Others on Which It Is Operable: CDC 7600, CDC 6600, IBM 360/195.