

# Computer Code Abstract

## 3DP

### A Three-Dimensional Perturbation Code

1. Name of Code: 3DP.<sup>1</sup>
2. Computer for Which Code is Designed: UNIVAC 1108.
3. Nature of Code: 3DP is a three-dimensional perturbation theory code designed to compute reactivity coefficient traverses, the effective delayed neutron fraction, the neutron generation time, the inhour/ $\delta k$  conversion factor, and cross-section activity traverses. Available geometry options include X-Y-Z, R- $\Theta$ -Z, and triangular-Z.
4. Method of Solution: First-order perturbation theory based on the finite difference multigroup diffusion model is used to calculate reactivity coefficients.
5. Restrictions on Complexity: Variable dimensioning is utilized in 3DP to maximize available core memory.
6. Typical Machine Time: A representative 2-group,  $20 \times 20 \times 20$  problem requires about  $\frac{1}{2}$  min on a UNIVAC 1108.
7. Related and Auxiliary Programs: The perturbation equation used in 3DP is consistent with the finite difference multigroup equations<sup>2</sup> used in 3DB.
8. Status: In use.
9. Machine Requirements: A 65K core and ten logical peripheral storage devices are required.
10. Programming Language: FORTRAN-IV.
11. Material Available: A source deck, sample problem, and operating instructions are available from the authors.
12. *Acknowledgment*: This paper is based on work performed under U.S. Atomic Energy Commission Contract AT(45-1)-2170.
13. *References*:
  - <sup>1</sup>R. W. HARDIE and W. W. LITTLE, Jr., "3DP, A Three-Dimensional Perturbation Theory Code," HEDL-TME-72-134, Hanford Engineering Development Laboratory, Richland, Washington (1972).
  - <sup>2</sup>R. W. HARDIE and W. W. LITTLE, Jr., "3DB, A Three-Dimensional Diffusion Theory Burnup Code," BNWL-1264, Pacific Northwest Laboratory, Richland, Washington (1970).

R. W. Hardie  
W. W. Little, Jr.

Hanford Engineering Development Laboratory  
Reactor and Safety Engineering Department  
P. O. Box 1970  
Richland, Washington 99352

Received November 6, 1972