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COG11.3 Abstract

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COG11.3 Abstract

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COG is a high-resolution code for the Monte Carlo simulation of coupled particle transport in arbitrary 3-D geometry. COG will transport neutrons, protons, deuterons, alpha particles with energies up to hundreds of GeV, and photons with energy ranges limited by the available cross section sets and physics models. Electrons can be transported via the EGS5 electron transport kernel, electrons can also be transported. The COG code is a significant upgrade from earlier Monte Carlo transport codes and has been written specifically to make it more versatile, accurate, and easy to use. COG has provisions for calculating deep penetration (shielding) problems, criticality problems, and neutron activation problems.

1. NAME AND TITLE

COG Version 11.3: Multiparticle Monte Carlo Code System for Shielding and Criticality Use.

Version 11.3 is an updated version of COG11.1 (RSICC code package # CCC-829 MNYCP 00).

This Abstract provides only new information concerning the update.

New features in Version 11.3:

- A new Fission Reaction Event Yield Algorithm (FREYA) in basic data block;
- A new POI (probability of initiation) in basic data block;
- A new Alpha particles calculation in Alpha Transport data block;
- A new Deuteron particles calculation in Deuteron Transport data block;
- A new Rectangular Parallelepiped (RPP) in surface data block;
- A new Rectangular lattice in geometry data block;
- A new X-Oriented triangular lattice in geometry data block;
- A new Y-Oriented triangular lattice in geometry data block;
- A new secondary thermal library in mix data block;
- A new secondary probability library in mix data block;
- A new list mode output to list time, energy, and score in detector data block;
- A new detector isotope mask in detector data block;
- A new detector reaction mask in detector data block;
- A new secondary detector energy response function in detector data block;
- A new Imaging detector score in detector data block;
- A new simple algorithm to calculate β_{eff} (effective delayed neutron fraction) output;
- A new Spontaneous Fission Energy Source (SFS) in source data block;

A new source energy option: FissSrc in source data block;
 A number of new data libraries.

Data libraries available for COG11.3:

Alpha libraries	ICE.208K ICE.228K ICE.253K JEFF3.3 JENDL5.ACE MCNP.80nc N.348K FUDGE.ACE9.12.19 CD113HYBRID
Deuteron libraries	
D.ENDFB7R1	
D.ENDFB8R1	
NIST-PSTAR de/dx table	Photon libraries
P.DEDX	EPICS2017 EPICS2023
Delayed Fission Gamma library	Fission product yield libraries
DFG.ENDFB8R0	FY.ENDFB8R0 FY.ER
Activation libraries	RadSrc Gamma library
EAF2010	G.RSCOG
DC.ENDFB7R1.g	
DC.ENDFB8R0.g	
EGS5 Photon-Electron libraries	Dosimetry libraries
clinac5.edat	IRDFF1.05 IRDFF-II JEFF3.3
ElectronLib	
ElectronLib.edat	
Neutron libraries	Photonuclear libraries
ENDFB7R0V2	PN.ENDFB80 PN.ENDFB8R1 PN.IAEA2019
ENDFB8B3	
ENDFB8B3.ACE	
ENDFB8R0	
ENDFB8R0.300K	
ENDFB8R0.400K	
ENDFB8R0.500K	
ENDFB8R0.ACE	Probability table libraries
ENDFB8R0v3	PT.ENDFB8B3.ACE PT.ENDFB8R0.ACE PT.ENDFB8R1beta4.ACE PT.FUDGE.ACE9.12.19 PT.JEFF3.3 PT.JENDL5.ACE PT.MCNP.80nc PT.URR2019
ENDFB8R0X	
ENDFB8R1	
ENDFB8R1beta4.ACE	
ENDL2021	
ICE.188K	

Thermal libraries	T.H.H2O.NCSU.25C.ACE
T.CAB2015.ACE	T.HinHF
T.ENDFB8B4	T.HZIce
T.ENDFB8R0	T.JEFF3.2
T.ENDFB8R0.ACE	T.JEFF3.3.ENDF
T.ENDFB8R1beta4.ACE	T.JENDL4
T.ENDFB8R1.RT	T.JENDL5
T.FUDGE21.07.21	T.JENDL5RmTmp
T.FUDGE21.09.02	T.MCNP.71
T.H.H2O.NCSU.25C	T.MCNP.80

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3. COMPUTER HARDWARE REQUIREMENTS

Supported platforms are:

PC workstations running Windows10 OS with WSL or Mac OS 10.15.x with MacPorts; Workstations/Clusters running Linux OS.

The code system without the data libraries requires 2 GB of disk space.

The standard data library set requires 64 GB.

4. COMPUTER SOFTWARE REQUIREMENTS

Fortran and C source files are not included in this package. Bash SHELL is required to run the installation scripts. The code uses graphics routines from the PGPLLOT subroutine library.

The package includes executables created on:

Dell 560 with Intel Q8300 processor running Red Hat 7 OS, GNU gfortran and gcc compilers;

Intel Xeon processors running GNU/Linux OS, GNU gfortran and gcc compiler

5. CONTENTS OF CODE PACKAGE

COG is distributed on DVD. Included are executables for Windows and Linux, data libraries, test cases and documentation. Source codes are not included in this distribution.

6. DATE OF ABSTRACT

March 27, 2025.

KEYWORDS: ACTIVATION; COMPLEX GEOMETRY; COUPLED; CRITICALITY CALCULATIONS; CROSS SECTIONS; ELECTRON; GAMMA-RAY; MONTE CARLO; NEUTRON; PROTON