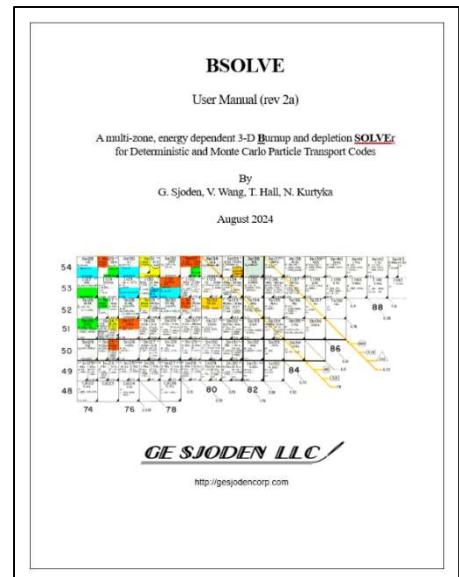# GE SJODEN LLC

BSOLVE burnup solver -- Licensing Options:

BSOLVE[1] is a fully energy dependent, self-adaptive timestep burnup and depletion solver linked to neutron transport codes MCNP6[2] or PENTRAN[3]. BSOLVE employs a self-adaptive Runge-Kutta (RKF/RKV) systems solver with dynamically adaptive error control and multigroup isotope tracking across all coupled differential equations in time. BSOLVE preserves energy dependence and fluxes in burnup reaction mechanisms, with dynamically updated energy and isotope dependent fission yields, and isotopes causing fission, enabling very accurate depletion steps. MCNP6 uses Continuous Energy libraries for rad-transport and multigroup burnup; PENTRAN uses multigroup data.

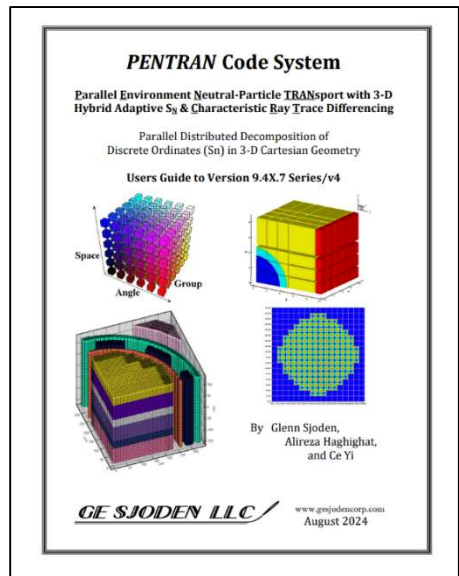## Trial Pricing and Training/Consulting options Available*

BSOLVE[1] for MCNP[2] Includes:

- GMIX cross section processing and multigroup depletion cross sections for fission products/actinides; MCNP[2] uses C/E xsecs
- PMCBSOLVE pre- and post- processing
- BSOLVE + MCBURNDRIVER scripts
- Linux OS required. Up to 2 h of on-line training on demo problem, and upgrades for any codes during license period.
- Extended on-line consulting available;
  [1]*US Person status verification is required for burnup codes; up to 5 persons, unlimited machines, annual license renewal.*
  [2]*MCNP6 must be obtained by the user via RSICC. MCNP6 is a product of Triad National Security, LLC, Los Alamos National Laboratory, 2018.*

BSOLVE[1] with PENTRAN[3] Includes:

- [1]US Person status verification is required for burnup codes
- GMIX cross section processing and 10 group cross sections for fission products/actinides
- REPRO, PPEN.pre/.post
- PENDATA,
- BSOLVE + BURNDRIVER scripts
- PENMSHXP block adaptive 3-D mesh generator with material balance
- PENTRAN with MPI support
- Linux OS required. Up to 3 h of on-line training on demo problem, and upgrades for any codes during license period.
- Extended on-line consulting available
  [3]*PENTRAN is included, from http://gesjodencorp.com. Available to most countries, but falls under ECCN 0D999(b), US Dept of Commerce classification, 21Mar 2011. Country citizenship verification is required for all users.   Up to 5 persons, unlimited machines, annual license renewal.*

Contact glenn@gesjodencorp.com for additional details

BSOLVE

User Manual (rev 2a)

A multi-zone, energy dependent 3-D Burnup and depletion SOLVEr for Deterministic and Monte Carlo Particle Transport Codes

By

G. Sjoden, V. Wang, T. Hall, N. Kurtyka

August 2024

GE SJODEN LLC

http://gesjodencorp.com

PENTRAN Code System

Parallel Environment Neutral-Particle TRANsport with 3-D Hybrid Adaptive S_N & Characteristic Ray Trace Differencing

Parallel Distributed Decomposition of Discrete Ordinates (Sn) in 3-D Cartesian Geometry

Users Guide to Version 9.4X.7 Series/v4

By Glenn Sjoden, Alireza Haghighat, and Ce Yi

GE SJODEN LLC   www.gesjodencorp.com
August 2024

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USE of BSOLVE implies user consent with the following License Agreement:

Proof of US Citizenship/US Person status is required for all BSOLVE users before a sale can be completed due to export control regulations for burnup codes.

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