NJOY – Current Status and Future Plans

A.C.(Skip) Kahler & Jeremy L. Conlin
Los Alamos National Laboratory

Cross Section Evaluation Working Group Meeting
Brookhaven National Laboratory
November 2-4, 2015

UNCLASSIFIED

Abstract

We provide an overview of the NJOY Nuclear Data Processing Code System, including recent history, current status and future upgrade plans.

Outline

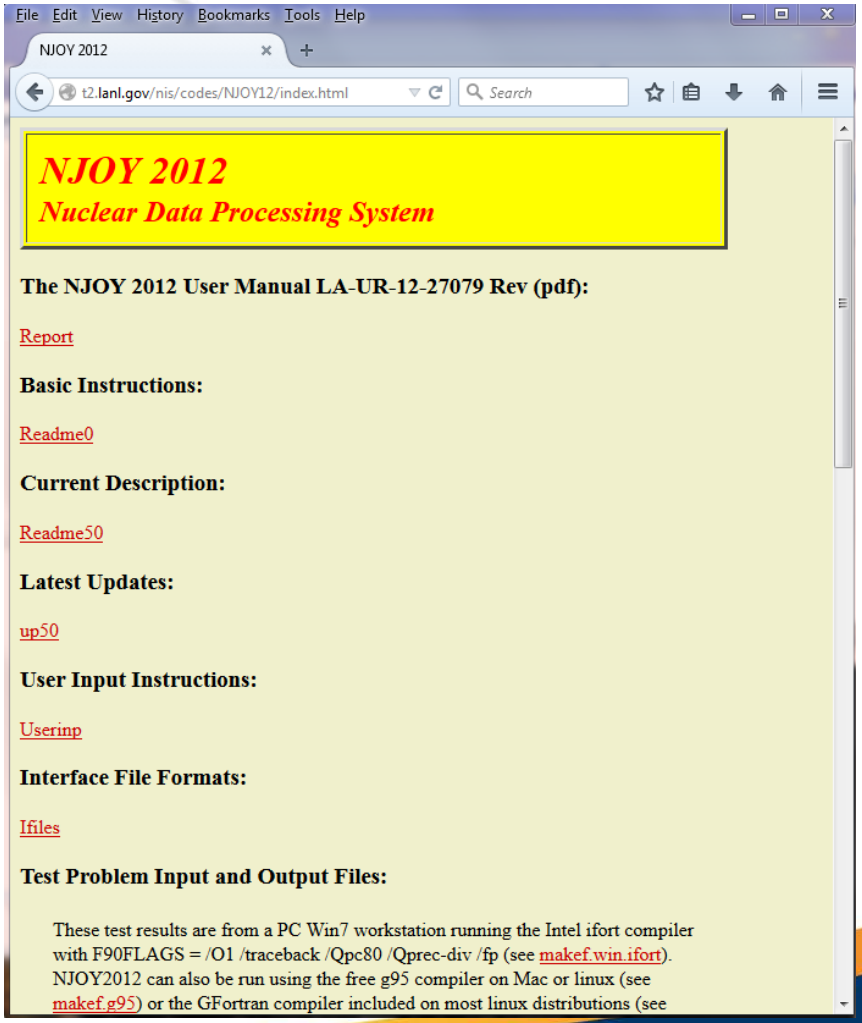
- Introduction & NJOY Review
- Current Status
- Future Upgrade Plans
- Concluding Remarks

Introduction & NJOY Review

- The NJOY Nuclear Data Processing System has been publically available for almost 40 years.
- Primary developer was Bob MacFarlane.
  - Retired in 2006 but has remained active in NJOY development.
- The most widely distributed version of the code is NJOY99; the current public version is **NJOY2012**.
- Updates are posted to a LANL website and the source code is updated by end-users.
  - Also allows end-users to include local patches.
- Unofficial updates and pre-release candidate updates are available from the NEA at http://www.nea.fr/html/dbprog/njoy-links.html.

Introduction & NJOY Review

- The most recent version of the code is NJOY2012.
  - Available directly from LANL (for a fee, ☹), per LANL Theoretical Division management decree.
    - See contact information at http://t2.lanl.gov/nis/transfer.html
- LANL's NJOY2012 web page …
  - http://t2.lanl.gov/nis/codes/NJOY12/index.html
  - Can find links to
    - The NJOY2012 manual.
    - Latest update file, currently up50.
    - Sample test job i/o files.



NJOY2012 – Current Status

- NJOY2012 was released in December, 2012
- An initial set of update patches was released in August, 2013 (creating NJOY2012.8).
- The latest set of update patches was released in February, 2015 (creating NJOY2012.50).
- New patches are nearing completion and will be released within the next few months.

NJOY2012 – Current Status

- Current update work includes …
  - Improvements to detailed elastic scattering angular distributions associated with LRF=7 resonances.
    - Preliminary coding by Bob has been shared with select CIELO members.
  - WPEC SG42 related improvements.
    - THERMR and LEAPR
  - Incorporate the latest “CODATA” physical constants.
  - ACE plus covariance data format.
    - Specifications have been developed, coding is in progress.
  - ACE version 2 format.
    - ENDF/B-VII.1 (.80c - .86c) already issued in a preliminary v2 format, but it is not recognized by the current MCNP6.
    - Further revisions are in progress to make this format more robust.

NJOY – Future Plans

- Near Term
  - Complete the on-going updates noted previously.
  - Work on a new clean code version … NJOY2016.
    - Need to work with internal LANL management and our “Technology Transfer” organization on this.
- Long Term
  - For me … retirement, ☺!
  - For NJOY … “NJOY21” … Jeremy Conlin
    - NJOY21 = NJOY for the 21st Century
    - Current and past NJOY i/o is very much “cardimage” and ENDF “mf” and “mt” centric
      - NJOY21 will work with the new “GND” format.

NJOY – Future Plans

- NJOY21
  - **Maintain capability of and backwards compatibility with NJOY2012**
  - Modern software development practices …
    - Unit, integration tests
    - Issue tracker
  - C++ … with Python bindings
  - `git` version control
  - Eliminate export control restrictions
    - **Open source** / encourage continued collaboration

NJOY – Future Plans

- NJOY21 is under development now …
  - All NJOY legacy modules are available
  - Extensive input checking
  - Python interface
  - Independent ENDF6 reader
  - Read/Write ACE files
  - Read/Write GND files
  - Read/Write NDI (internal LANL) files
  - LANL will continue to solicit external user input … njoy21@lanl.gov

Concluding Remarks

- NJOY has a long history as the premier ENDF processing code system … and LANL is committed to maintaining this capability as the ENDF format evolves.

- NJOY's past success is due to (i) Bob MacFarlane, and (ii) feedback by national and international users on code features of importance to them.

- We continue to welcome this interaction between LANL and the world-wide user community.
  - Send input to njoy21@lanl.gov