Progress of JENDL

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Introduction

The current version JENDL-4.0 was released in 2010 with improving fission-product, minor-actinide, and covariance.

We are trying to develop nuclear data libraries to meet needs in various field of applications.

Special Purpose File

Recently released:

JENDL/ImPACT-2018: LLFP transmutation CS (Aug. 2019)

JENDL/PD-2016.1: revision of photonuclear data file (Jan. 2020)

To be released:

JENDL/DEU-2020: deuteron induced reaction

General Purpose File

JENDL-5: under development of next version of JENDL

JENDL/PD-2016.1

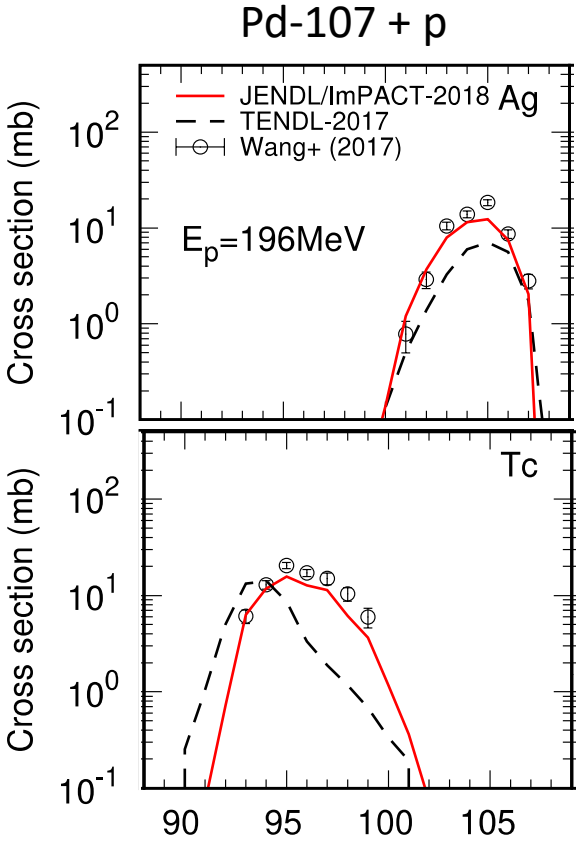
JENDL Photonuclear Data File 2016 revision 1

- The evaluations have been done in connection with IAEA CRP on “Photonuclear Data and Photon Strength Functions.”
- The file includes the data of 2,684 nuclides ranging from H-2 (Z=1) to Lr-266 (Z=103).
- The photonuclear data are revised for 1096 nuclides from Si to Fm: mainly structural nuclides, actinides and nuclides with 10 min half-life or longer along the stability line.
- The upper energy is extended up to 200 MeV for nuclides evaluated by the CCONE code by the request of the CRP.

JENDL/ImPACT-2018

JENDL LLFP transmutation cross section File 2018

- Aiming at establishing reasonable nuclear transmutation methods which will enable these wastes to be converted into stable nuclides or short-lived ones.
- JENDL/ImPACT-2018 contains 163 nuclides which could produced in transmutation of LLFPs (Se-79, Zr-93, Pd-107, Cs-135).
- The file includes the data for proton and neutron induced reactions up to 200 MeV.



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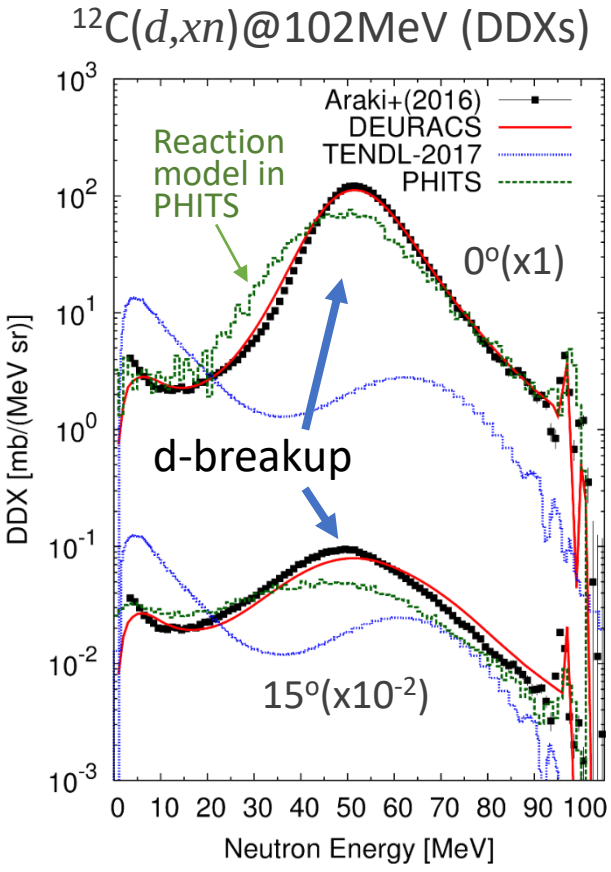
JENDL/DEU-2020

JENDL deuteron reaction data file

- Aiming to provide the data for accelerator-based neutron source
- The file contains the deuteron induced reaction data on Li-6,7, B-9, and C-12, 13 up to 200 MeV.
- Evaluations have been performed with a reaction model code system DEURACS (CDCC + Glauber + DWBA + CCONE).
- The data will be prepared in the format of ENDF, ACE and Frag data (PHITS).
- To be released this year.



Plan of JENDL-5

For acceleration of nuclear innovation on backend
as well as various applications

- Neutron data
  - Include all stable isotopes
  - Add isomer production for activation
  - Resonance of light nuclei by a new R-matrix code AMUR
  - MA resonance with new J-PARC data
  - Fast neutron fission cross section for major actinide
  - covariance data of structure material and light nuclei
- Thermal scattering law for light water
- Charged particle induced reactions
- To be released in 2022

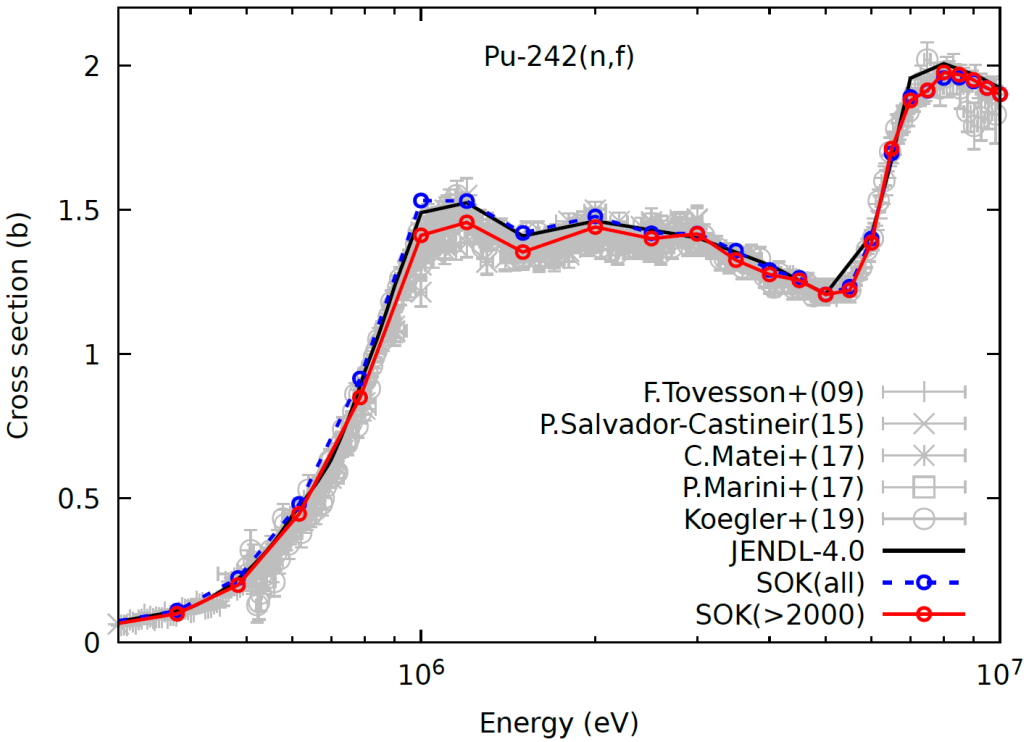
Test libraries of JENDL-5

- The first test version JENDL-5α1 was created in 2018 with revision or new evaluation for
  - Ga, Zr, Nb, Tc, Ru, Sb, Te, I, Pr, Gd, Er, Ta, Re, Pt, Hg, Tl, U, Pu, Am
  - New evaluation of thermal scattering law for light water
- The JENDL-5α2 and JENDL-5α3 were created in 2020 by updating the data of
  - N, O, Na, Mn, Cu, Pd, Eu, Pb, Bi, U, Pu
- Benchmark tests for nuclear reactors and shieldings are in progress.

Actinide evaluation

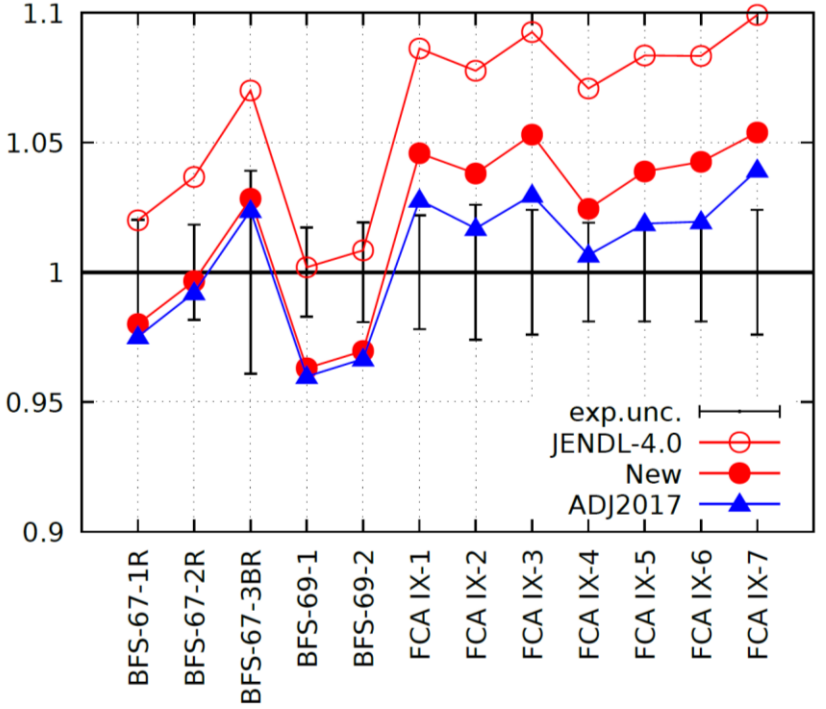
- New resonance parameters deduced from new ANNRI measurements for MA.
- Create test files adopting CIELO evaluations of resolved resonance parameters of major actinides.
- Prompt fission neutron spectra of ENDF/B-VIII.0 were adopted below 5 MeV for U-235.
- Simultaneous evaluation of the fission cross sections in the fast neutrons energy region for 6 major isotopes of U and Pu.
- Fission cross sections of MAs are being updated based on new measurements.
- Resonance parameters at low energy for Pu-238 are updated based on the recent measurements.

Preliminary evaluation of ^{242}Pu fission cross section



Recent measurements show lower cross section.

Fission reaction rates measured by FR



Overestimation of fission reaction rate would be improved.

Future plan of JENDL-5

- Revision of data using feedback of benchmark results
- Covariance evaluation
- Fission product yields (Tokyo Tech.)
- Decay data
- Evaluation of thermal scattering law data
- Calculation of recoil nucleus spectrum for estimation of KERMA factor
- Documentation

Validation of JENDL-5 using integral experiments

- JAEA prepares new MVP input files of ICSBEP/IRPhEP benchmarks.
  - For Quality Assurance
  - The benchmark geometry and nuclide compositions are compared to the ICSBEP report.
  - Documents of the input parameters and overview of each experiments are prepared.
- The MVP input files are provided to VaNDaL project (SG45).

New MVP input files

- 772 MVP input files were newly prepared.
  - Mainly thermal spectrum
  - Since quality of fast spectrum input files are high, we focused on the thermal spectrum input files.

	COMP	METAL	SOL	Total
PU			159	159
HEU	7	62	42	111
IEU	6			6
LEU	249	10	8	267
MOX	63			63
U233	9	10	147	166
Total	334	82	356	772

Current status of JENDL-5 validation

- We are now preparing cross-section library for MVP, MCNP, and PHITS
  - All nuclear data files are processed by FRENDY and NJOY2016
    - We found some differences and are investigating the cause of differences
  - Processing results are reflected to evaluation team.
    - Error messages, comparison of processing results between FRENDY and NJOY
- Calculations of ICSBEP/IRPhEP benchmarks are now under going.