Máster Interuniversitario en Física Nuclear

UNIVERSIDAD DE SEVILLA

PROPAGATION OF ERRORS IN NUCLEAR DATA TO REACTOR PARAMETERS

CIEMAT
Unidad de Innovación Nuclear
División de Fisión Nuclear - Dpto. Energía
Additional information

Master thesis

Author:
José Llanes Gamonoso

Thesis directors:
Vicente Becares Palacios, Francisco Álvarez Velarde,
Carlos Guerrero Sánchez

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A Values of k_{eff}, β_{eff} and their uncertainties.

Table A.1: Multiplication factor k_{eff} and total uncertainties for each reactor.

Benchmark	k_{eff}^{exp}	$k_{eff}^{MCNP}\pm$ Stat. Unc.	Unc. to Data$\pm$ Stat. Unc.		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
HEU-MET -INTER- 001	0.997 $\pm$ 0.003	1.01018 $\pm$ 0.00002	0.018268 $\pm$ 0.000019	0.00935 $\pm$ 0.00005	0.013770 $\pm$ 0.000011
MIX-COMP -FAST- 005	0.9913 $\pm$ 0.0023	0.99255 $\pm$ 0.00001	0.009689 $\pm$ 0.000011	0.008910 $\pm$ 0.000015	0.006152 $\pm$ 0.000006
PU-MET -INTER- 002	0.9878 $\pm$ 0.0023	1.00259 $\pm$ 0.00002	0.01309 $\pm$ 0.00011	0.00806 $\pm$ 0.00004	0.005552 $\pm$ 0.000022
PU-MET -INTER- 004	0.9723 $\pm$ 0.0025	0.97378 $\pm$ 0.00002	0.009692 $\pm$ 0.000011	0.006823 $\pm$ 0.000015	0.006380 $\pm$ 0.000020
IEU-MET -FAST- 010	0.9954 $\pm$ 0.0024	0.99735 $\pm$ 0.00002	0.018810 $\pm$ 0.000021	0.01437 $\pm$ 0.00003	0.006380 $\pm$ 0.000020
IEU-MET -FAST- 020	1.002 $\pm$ 0.0013	1.00562 $\pm$ 0.00001	0.015714 $\pm$ 0.000008	0.008200 $\pm$ 0.000012	0.010980 $\pm$ 0.000004
IEU-MET -FAST- 021	1.00839 $\pm$ 0.00145	1.01149 $\pm$ 0.00001	0.016834 $\pm$ 0.000009	0.010713 $\pm$ 0.000019	0.012207 $\pm$ 0.000011
IEU-MET -FAST- 022	1.00077 $\pm$ 0.00134	1.00233 $\pm$ 0.00001	0.016435 $\pm$ 0.000007	0.007472 $\pm$ 0.000010	0.011107 $\pm$ 0.000003
LEU-COMP -THERM- 006	1.0000 $\pm$ 0.0025	1.00072 $\pm$ 0.00001	0.008652 $\pm$ 0.000004	0.007082 $\pm$ 0.000003	0.0091990 $\pm$ 0.0000011
LEU-COMP -THERM- 067	1.0005 $\pm$ 0.0005	1.00163 $\pm$ 0.00004	0.00907 $\pm$ 0.00008	0.00771 $\pm$ 0.00009	0.01007 $\pm$ 0.00006
PU-MET -FAST- 001	1.0002 $\pm$ 0.0037	0.99929 $\pm$ 0.00001	0.006881 $\pm$ 0.000004	0.0073271 $\pm$ 0.0000019	0.013770 $\pm$ 0.000011
IEU-MET -FAST- 007	1.0045 $\pm$ 0.0007	1.00493 $\pm$ 0.00001	0.018049 $\pm$ 0.000010	0.013764 $\pm$ 0.000017	0.011716 $\pm$ 0.000006
PU-MET -FAST- 006	1.000 $\pm$ 0.003	1.00335 $\pm$ 0.00002	0.009819 $\pm$ 0.000011	0.008137 $\pm$ 0.000009	0.007409 $\pm$ 0.000009

Table A.2: Multiplication factor k_{eff} and total uncertainties for each reactor.

Benchmark	k_{eff}^{exp}	$k_{eff}^{MCNP}\pm$ Stat. Unc.	Unc. to Data$\pm$ Stat. Unc.		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
U233-MET-FAST-006	1.0000 ± 0.0014	1.00337 ± 0.00002	0.010679 ± 0.000008	0.011407 ± 0.000007	0.011621 ± 0.000006
HEU-MET-FAST-001	1.000 ± 0.001	1.00013 ± 0.00001	0.013189 ± 0.000010	0.010413 ± 0.000012	0.012084 ± 0.000003
HEU-MET-FAST-028	1.000 ± 0.003	1.00412 ± 0.00001	0.014152 ± 0.000009	0.008806 ± 0.000011	0.012332 ± 0.000006
FCA-XIX-1	-	1.00761 ± 0.00002	0.014593 ± 0.000007	0.008627 ± 0.000009	0.013061 ± 0.000004
FCA-XIX-2	-	1.21884 ± 0.00002	0.008631 ± 0.000009	0.007346 ± 0.000013	0.005784 ± 0.000008
FCA-XIX-3	-	0.99441 ± 0.00002	0.007109 ± 0.000013	0.00669 ± 0.00003	0.005306 ± 0.000022
SNEAK-7A	-	1.0095 ± 0.00002	0.008618 ± 0.000010	0.007185 ± 0.000015	0.005619 ± 0.000008
SNEAK-7B	-	1.00488 ± 0.00001	0.010033 ± 0.000011	0.009633 ± 0.000019	0.006579 ± 0.000007
MASUR-CA_R2	-	0.99246 ± 0.00002	0.01658 ± 0.00011	0.00703 ± 0.00008	0.01207 ± 0.00008
MASUR-CA_ZONA2	-	1.00309 ± 0.00002	0.00813 ± 0.00009	0.00689 ± 0.00007	0.00522 ± 0.00005
HEU-MET-FAST-062	0.9987 ± 0.001	1.00338 ± 0.00002	0.013792 ± 0.000012	0.008211 ± 0.000013	0.011923 ± 0.000008
HEU-MET-FAST-100	1.0026 ± 0.0007	1.00412 ± 0.00001	0.013210 ± 0.000010	0.010373 ± 0.000012	0.012097 ± 0.000004

Table A.3: Delayed neutron fraction β_{eff} and total uncertainties for each reactor. In the top of each row is the β_{eff} and uncertainty calculated by Bretscher's method, and in the bottom by Chiba's method.

Benchmark	β_{eff}^{exp} (pcm)	$\beta_{eff}^{eval} \pm$ Stat. Unc. (pcm)	Unc. to Data$\pm$ Stat. Unc. (pcm)		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
HEU-MET -INTER- 001	659 ± 13	682 ± 3	32 $\pm$ 6	27 $\pm$ 5	34.7 $\pm$ 1.9
		684.20 ± 0.10	4.47 $\pm$ 0.12	18.22 $\pm$ 0.04	31.208 $\pm$ 0.021
MIX-COMP -FAST- 005	381 ± 8	387.9 ± 1.4	9.3 $\pm$ 1.9	15.9 $\pm$ 2.2	8 $\pm$ 3
		375.60 ± 0.10	5.1 pm 0.1	10.86 $\pm$ 0.07	4.34 $\pm$ 0.05
PU-MET -INTER- 002	222 ± 4	234 ± 3	22 $\pm$ 4	29 $\pm$ 8	18 $\pm$ 4
		233.10 ± 0.10	1.79 $\pm$ 0.15	11.32 $\pm$ 0.07	1.35 $\pm$ 0.22
PU-MET -INTER- 004	223 ± 10	250 ± 3	10.7 $\pm$ 1.8	14.2 $\pm$ 1.7	15 $\pm$ 4
		248.60 ± 0.10	1.88 $\pm$ 0.10	10.386 $\pm$ 0.017	1.35 $\pm$ 0.09
IEU-MET -FAST- 010	725 ± 15	738 ± 3	11 $\pm$ 3	21 $\pm$ 3	22.1 $\pm$ 2.4
		713.60 ± 0.20	6.06 $\pm$ 0.21	18.21 $\pm$ 0.07	19.95 $\pm$ 0.03

Table A.4: Delayed neutron fraction β_{eff} and total uncertainties for each reactor. In the top of each row is the β_{eff} and uncertainty calculated by Bretscher's method, and in the bottom by Chiba's method.

Benchmark	β_{eff}^{exp} (pcm)	$\beta_{eff}^{eval}\pm$ Stat. Unc. (pcm)	Unc. to Data$\pm$ Stat. Unc. (pcm)		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
IEU-MET -FAST- 020	$(7.7 \pm 0.5) \cdot 10^1$	746.8±1.4	7.8 ± 1.5	22.4 ± 1.9	23.4 ± 1.0
		728.20±0.10	5.02 ± 0.07	18.04 ± 0.03	22.954 ± 0.012
IEU-MET -FAST- 021	$(7.7 \pm 0.5) \cdot 10^1$	750.3±1.4	6.7 ± 1.4	21.0 ± 2.0	22.6 ± 0.4
		732.20±0.10	5.54 ± 0.08	18.53 ± 0.05	21.977 ± 0.011
IEU-MET -FAST- 022	$(7.7 \pm 0.5) \cdot 10^1$	750.3±1.4	9.0 ± 2.0	19.7 ± 1.2	23.8 ± 0.3
		728.40±0.10	5.15 ± 0.07	17.66 ± 0.03	23.768 ± 0.012
LEU-COMP -THERM- 006	771±19	795.4±1.4	5.3 ± 0.7	22.24 ± 0.16	30.15 ± 0.06
		787.60±0.10	4.96 ± 0.04	21.928 ± 0.009	30.021 ± 0.009
LEU-COMP -THERM- 067	750±19	774.7±4.4	6 ± 6	23 ± 5	31 ± 11
		767.3±0.3	4.6 ± 0.3	22.13 ± 0.19	30.47 ± 0.19

Table A.5: Delayed neutron fraction β_{eff} and total uncertainties for each reactor. In the top of each row is the β_{eff} and uncertainty calculated by Bretscher's method, and in the bottom by Chiba's method.

Benchmark	β_{eff}^{exp} (pcm)	$\beta_{eff}^{eval}\pm$ Stat. Unc. (pcm)	Unc. to Data$\pm$ Stat. Unc. (pcm)		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
PU-MET -FAST- 001	194$\pm$10	188.1$\pm$1.4	1.8 $\pm$ 0.4	4.58 $\pm$ 0.07	1.14 $\pm$ 0.12
		188.50$\pm$0.10	1.53 $\pm$ 0.04	4.529 $\pm$ 0.004	1.150 $\pm$ 0.007
IEU-MET -FAST- 007	720$\pm$7	739.4$\pm$1.4	6.9 $\pm$ 2.0	21 $\pm$ 3	20.5 $\pm$ 0.5
		714.90$\pm$0.10	5.69 $\pm$ 0.10	18.21 $\pm$ 0.04	20.058 $\pm$ 0.011
PU-MET- -FAST- 006	276$\pm$7	287$\pm$3	4.0 $\pm$ 1.6	9.2 $\pm$ 1.5	4.1 $\pm$ 0.7
		284.10$\pm$0.10	3.15 $\pm$ 0.07	7.74 $\pm$ 0.06	2.02 $\pm$ 0.04
U233-MET -FAST- 006	360$\pm$14	376$\pm$3	25.6 $\pm$ 0.6	21.6 $\pm$ 0.6	20.5 $\pm$ 0.3
		374.30$\pm$0.10	24.853 $\pm$ 0.018	20.94 $\pm$ 0.03	19.965 $\pm$ 0.016
HEU-MET -FAST- 001	659$\pm$10	650.9$\pm$1.4	8.9 $\pm$ 1.4	19.2 $\pm$ 0.8	29.46 $\pm$ 0.07
		648.00$\pm$0.10	9.14 $\pm$ 0.09	19.02 $\pm$ 0.03	29.748 $\pm$ 0.014

Table A.6: Delayed neutron fraction β_{eff} and total uncertainties for each reactor. In the top of each row is the β_{eff} and uncertainty calculated by Bretscher's method, and in the bottom by Chiba's method.

Benchmark	β_{eff}^{exp} (pcm)	$\beta_{eff}^{eval}\pm$ Stat. Unc. (pcm)	Unc. to Data$\pm$ Stat. Unc. (pcm)		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
HEU-MET -FAST- 028	675±13	692.1±1.4	9.4 ± 1.8	22.2 ± 1.7	27.1 ± 0.3
		687.20±0.10	6.99 ± 0.07	18.41 ± 0.03	27.353 ± 0.013
FCA -XIX- 1	742±24	764.2±2.8	14.4 ± 2.3	22.3 ± 1.7	34.1 ± 0.5
		760.10±0.20	4.45 ± 0.05	18.591 ± 0.021	32.760 ± 0.022
FCA -XIX- 2	364±9	362.6±2.3	13 ± 3	16 ± 4	11 ± 3
		357.10±0.10	3.83 ± 0.13	8.72 ± 0.06	3.79 ± 0.04
FCA -XIX- 3	251±4	256±3	17 ± 4	16 ± 4	9 ± 3
		257.80±0.10	1.69 ± 0.12	7.05 ± 0.06	1.67 ± 0.08
SNEAK-7A	$(40 \pm 3) \cdot 10$	387±3	7 ± 3	16 ± 4	8.3 ± 1.9
		372.40±0.10	5.46 ± 0.14	10.84 ± 0.08	3.80 ± 0.05

Table A.7: Delayed neutron fraction β_{eff} and total uncertainties for each reactor. In the top of each row is the β_{eff} and uncertainty calculated by Bretscher's method, and in the bottom by Chiba's method.

Benchmark	β_{eff}^{exp} (pcm)	$\beta_{eff}^{eval}\pm$ Stat. Unc. (pcm)	Unc. to Data$\pm$ Stat. Unc. (pcm)		
			JEFF-3.3	JENDL-4.0u	ENDF/B-VIII.0
SNEAK-7B	$(44.0 \pm 3.4) \cdot 10$	437.9±1.4	10.0 ± 2.1	19 ± 4	8.6 ± 2.3
		417.60±0.10	5.53 ± 0.15	11.95 ± 0.10	5.14 ± 0.05
MASURCA _R2	721±11	740±3	14 ± 11	25 ± 10	28 ± 8
		727.20±0.20	4.5 ± 0.7	17.7 ± 0.4	26.4 ± 0.7
MASURCA _ZONA2	349±6	352.9±2.8	9 ± 12	15 ± 10	9 ± 8
		345.40±0.10	4.1 ± 0.6	9.13 ± 0.18	3.2 ± 0.7
HEU-MET -FAST- 062	663±17	7'00±3	12.7 ± 2.5	19.5 ± 1.1	27.31 ± 0.13
		687.50±0.20	6.71 ± 0.09	18.36 ± 0.04	27.295 ± 0.018
HEU-MET -FAST- 100	657±9	646.3±1.4	11.0 ± 2.0	18.9 ± 0.6	29.41 ± 0.07
		648.60±0.10	9.00 ± 0.09	18.98 ± 0.03	29.710 ± 0.013

B Results of Chiba analysis

B.1 MIX-COMP-FAST-005

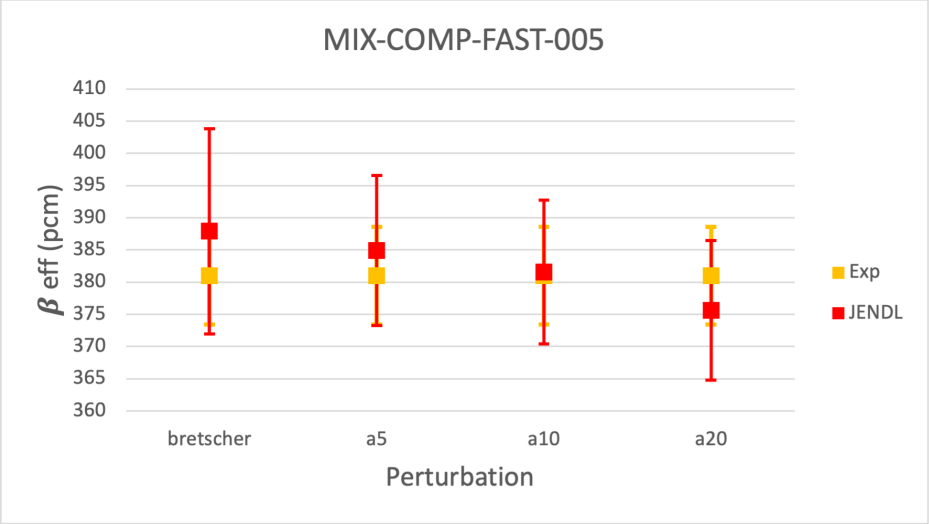

Figure B.1.1: Experimental and Chiba's method β_{eff} for different values of the perturbation.

Table B.1.1: Experimental and evaluated delayed neutron fraction of MIX-COMP-FAST-005 obtained for different cases. Uncertainty for the JENDL-4.0u library.

Case	MIX-COMP-FAST-005	
	β_{eff}±Stat. Unc. (pcm)	Unc. to Data ± Stat. Unc. (pcm)
Experimental	381 ± 2	-
Brestcher	387.9 ± 1.4	16.0 ± 8.5
$a = 5$	384.9 ± 0.3	11.6 ± 1.2
$a = 10$	381.60 ± 0.20	11.1 ± 0.6
$a = 20$	375.60 ± 0.10	10.85 ± 0.19

Table B.1.2: Evaluated reaction uncertainties due to data (standard deviation) of delayed neutron fraction of MIX-COMP-FAST-005 obtained for different cases. Uncertainty for the JENDL-4.0u library.

Case	MIX-COMP-FAST-005 uncertainties (%)			
	238U (n,n')	238U $\bar{\nu}_d$	56Fe (n,n)	239Pu $\bar{\nu}_d$
Bretscher	2.1 ± 0.8	1.895 ± 0.005	1.7 ± 0.8	1.5127 ± 0.0022
$a = 5$	1.32 ± 0.04	1.849 ± 0.003	-	1.5242 ± 0.0018
$a = 10$	1.139 ± 0.005	1.8197 ± 0.0023	-	1.5391 ± 0.0016
$a = 20$	1.157 ± 0.004	1.7689 ± 0.0019	-	1.5671 ± 0.0015

B.2 HEU-MET-INTER-001

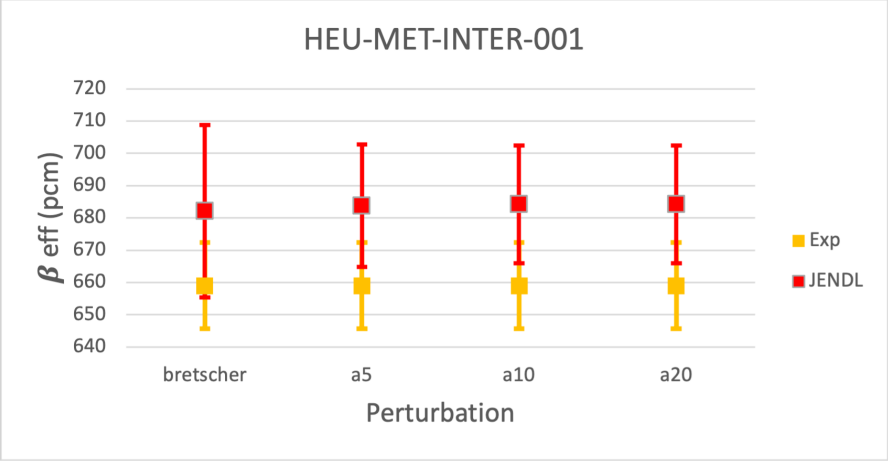

Figure B.2.1: Experimental and Chiba's method β_{eff} for different values of the perturbation.

Table B.2.1: Experimental and evaluated delayed neutron fraction of HEU-MET-INTER-001 obtained for different cases. Uncertainty for the JENDL-4.0u library. (*) Experimental uncertainty

Case	HEU-MET-INTER-001	
	β_{eff}±Stat. Unc. (pcm)	Unc. due to Data ± Stat. Unc. (pcm)
Experimental	659 ± 13.34*	-
Brestcher	682.1 ± 2.8	27 ± 14
$a = 5$	683.8 ± 0.6	19.0 ± 2.2
$a = 10$	684.2 ± 0.3	18.3 ± 0.8
$a = 20$	684.2 ± 0.1	18.2 ± 0.4

Table B.2.2: Evaluated reaction uncertainties due to data (standard deviation) of delayed neutron fraction of HEU-MET-INTER-001 obtained for different cases. Uncertainty for the JENDL-4.0u library.

Case	HEU-MET-INTER-001 uncertainties (%)	
	235U $\bar{\nu}_d$	56Fe (n,n)
Bretscher	2.627 ± 0.004	2.1 ± 1.2
$a = 5$	2.6214 ± 0.0024	0.76 ± 0.13
$a = 10$	2.6240 ± 0.0020	0.33 ± 0.04
$a = 20$	2.6274 ± 0.0018	-

B.3 IEU-MET-FAST-007

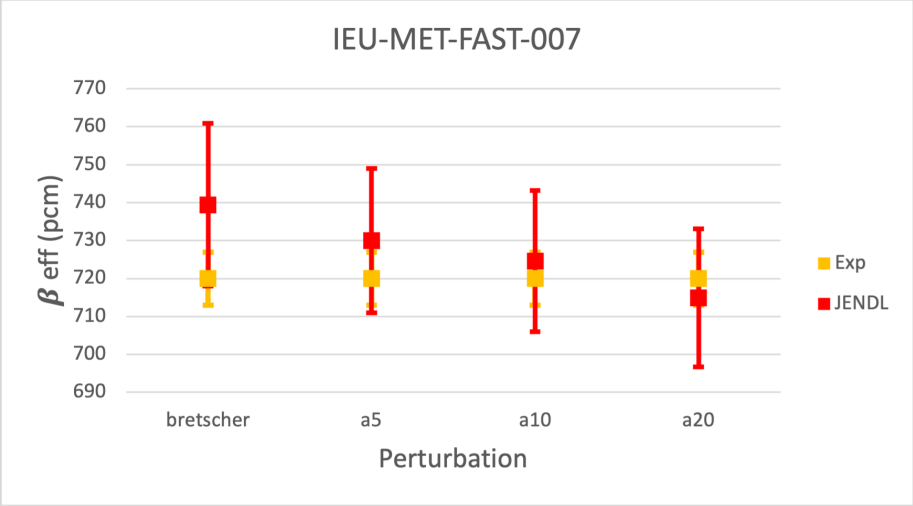

Figure B.3.1: Experimental and Chiba's method β_{eff} for different values of the perturbation.

Table B.3.1: Experimental and evaluated delayed neutron fraction of IEU-MET-FAST-007 obtained for different cases. Uncertainty for the JENDL-4.0u library. (*) Experimental uncertainty

Case	IEU-MET-FAST-007	
	β_{eff}±Stat. Unc. (pcm)	Unc. due to Data ± Stat. Unc. (pcm)
Experimental	720 ± 7*	-
Brestcher	739.4 ± 1.4	22 ± 8
$a = 5$	730 ± 0.3	19.0 ± 1.0
$a = 10$	724.6 ± 0.1	18.6 ± 0.6
$a = 20$	714.9 ± 0.1	18.2 ± 0.3

Table B.3.2: Evaluated reaction uncertainties due to data (standard deviation) of delayed neutron fraction of IEU-MET-FAST-007 obtained for different cases. Uncertainty for the JENDL-4.0u library.

Case	IEU-MET-FAST-007 uncertainties (%)		
	235U $\bar{\nu}_d$	238U $\bar{\nu}_d$	238U (n,n)
Bretscher	1.8640 ± 0.0018	1.4815 ± 0.0021	1.3 ± 0.8
$a = 5$	1.8964 ± 0.0015	1.4271 ± 0.0016	-
$a = 10$	1.9258 ± 0.0013	1.3866 ± 0.0013	-
$a = 20$	1.9739 ± 0.0011	1.3102 ± 0.0011	-

B.4 IEU-MET-FAST-010

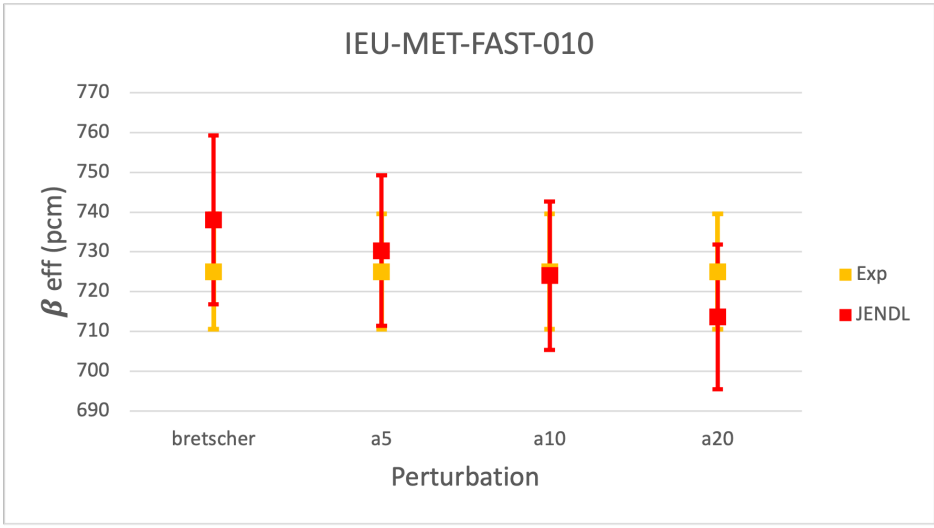

Figure B.4.1: Experimental and Chiba's method β_{eff} for different values of the perturbation.

Table B.4.1: Experimental and evaluated delayed neutron fraction of IEU-MET-FAST-010 obtained for different cases. Uncertainty for the JENDL-4.0u library. (*) Experimental uncertainty

Case	IEU-MET-FAST-010	
	β_{eff}±Stat. Unc. (pcm)	Unc. due to Data ± Stat. Unc. (pcm)
Experimental	725 ± 2*	-
Brestcher	738 ± 2.8	21 ± 10
$a = 5$	730.3 ± 0.6	18.9 ± 1.8
$a = 10$	724 ± 0.3	18.6 ± 0.9
$a = 20$	713.6 ± 0.2	18.2 ± 0.3

Table B.4.2: Evaluated reaction uncertainties due to data (standard deviation) of delayed neutron fraction of IEU-MET-FAST-010 obtained for different cases. Uncertainty for the JENDL-4.0u library.

Case	IEU-MET-FAST-010 uncertainties (%)		
	235U $\bar{\nu}_d$	238U $\bar{\nu}_d$	238U (n,n)
Bretscher	1.852 ± 0.003	1.504 ± 0.004	1.0 ± 1.0
$a = 5$	1.885 ± 0.003	1.448 ± 0.003	-
$a = 10$	1.9106 ± 0.0023	1.4031 ± 0.0023	-
$a = 20$	1.9601 ± 0.0021	1.3291 ± 0.0018	-

C Integrated Sensitivity profiles and Data Uncertainties for each Benchmark Reactor.

C.1 PU-MET-FAST-001

Table C.1.1: ISCs for the multiplication factor of PU-MET-FAST-001.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.96530 ± 0.00009
239Pu $\bar{\nu}_p$	0.96351 ± 0.00009
239Pu (n,f)	0.72813 ± 0.00010
239Pu χ	$(-0.15 \pm 8.7) \times 10^{-5}$

Table C.1.2: ISCs for the delayed neutron fraction.

Quantity	ISCs for the delayed neutron fraction of PU-MET-FAST-001.		
	Bretscher	Chiba	Kodeli, [1]
239Pu $\bar{\nu}_d$	0.945 ± 0.003	0.9483 ± 0.0007	0.9480
239Pu $\bar{\nu}_p$	-0.95 ± 0.07	-0.946 ± 0.004	-0.9470
239Pu χ	0.00 ± 0.07	0.000 ± 0.006	-

Table C.1.3: Reaction contribution to multiplication factor uncertainty of PU-MET-FAST-001. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (101%)	0.4513 ± 0.0006
239Pu χ/239Pu χ	0.40951 ± 0.00004
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.30293 ± 0.00005
239Pu (n,f)/239Pu (n,f)	0.43710 ± 0.00006
JENDL-4.0u (80.5%)	
239Pu (n,f)/239Pu (n,f)	0.43710 ± 0.00006
239Pu $\bar{\nu}$/239Pu $\bar{\nu}_p$	0.301085 ± 0.000022
239Pu χ/239Pu χ	0.2899 ± 0.0003
ENDF/B-VIII.0 (99.9%)	
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.31960 ± 0.00003
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.31903 ± 0.00003
239Pu χ/239Pu χ	0.19112 ± 0.00022

Table C.1.4: Reaction contribution to delayed neutron fraction uncertainty of PU-MET-FAST-001. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
239Pu χ/239Pu χ	0.8 ± 0.4	0.699 ± 0.008	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.37 ± 0.03	0.3673 ± 0.0007	-
JENDL-4.0u			
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	2.296 ± 0.008	2.2735 ± 0.0006	2.274
ENDF/B-VIII.0			
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.47 ± 0.03	0.47532 ± 0.00013	-
239Pu χ/239Pu χ	0.30 ± 0.12	0.286 ± 0.004	-

C.2 PU-MET-FAST-006

Table C.2.1: ISCs for the multiplication factor of PU-MET-FAST-006.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{nu}$	0.88307 ± 0.00024
239Pu $\bar{nu}_p$	0.88141 ± 0.00024
239Pu (n,f)	0.63230 ± 0.00025
239Pu χ	$(0.0 \pm 2.2) \times 10^{-4}$
238U (n,n')	0.06563 ± 0.00017
238U (n,f)	0.05628 ± 0.00007
238U (n,n)	0.1383 ± 0.0004

Table C.2.2: ISCs for the delayed neutron fraction of [name reactor].

Quantity	ISCs for the delayed neutron fraction.		
	Bretscher	Chiba	Kodeli, [1]
238U (n,n)	-0.16 ± 0.20	0.12 ± 0.03	0.1030
238U (n,n')	-0.15 ± 0.09	-0.159 ± 0.007	-0.1700
238U (n,f)	0.29 ± 0.04	0.246 ± 0.004	0.2610
238U $\bar{\nu}_d$	0.3709 ± 0.0021	0.3516 ± 0.0011	0.3610
238U $\bar{\nu}$	0.29 ± 0.04	0.256 ± 0.004	0.278
239Pu (n,f)	-0.32 ± 0.13	-0.286 ± 0.012	-0.3050
239Pu $\bar{\nu}_d$	0.5779 ± 0.0020	0.5790 ± 0.0012	0.5880
239Pu $\bar{\nu}_p$	-0.86 ± 0.12	-0.848 ± 0.009	-0.8790
239Pu $\bar{\nu}$	-0.29 ± 0.12	-0.269 ± 0.012	-0.2920
238U χ	0.00 ± 0.03	0.000 ± 0.003	-
239Pu χ	0.00 ± 0.11	0.000 ± 0.008	-
238U (n,γ)	-0.044 ± 0.013	-0.04971 ± 0.00011	-
235U $\bar{\nu}_d$	0.01919 ± 0.00011	0.0204 ± 0.0003	-
238U $\bar{\nu}_p$	-0.08 ± 0.03	-0.09538 ± 0.00008	-

Table C.2.3: Reaction contribution to multiplication factor uncertainty of PU-MET-FAST-006. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (75.9%)	
239Pu χ/239Pu χ	0.4879 ± 0.0015
238U (n,n')/238U (n,n')	0.4609 ± 0.0012
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.38213 ± 0.00011
JENDL-4.0u (79.3%)	
238U (n,n')/238U (n,n')	0.4141 ± 0.0014
238U (n,f)/238U (n,f)	0.37220 ± 0.00015
238U (n,n)/238U (n,n)	0.3401 ± 0.0011
ENDF/B-VIII.0 (74.9%)	
238U (n,n)/238U (n,n')	0.3871 ± 0.0009
238U (n,n)/238U (n,n)	0.3412 ± 0.0009
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.26931 ± 0.00008

Table C.2.4: Reaction contribution to delayed neutron fraction uncertainty of PU-MET-FAST-006. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
238U (n,n')/238U (n,f)	-1.0 ± 0.3	-0.940 ± 0.010	-
238U (n,n')/238U (n,n')	0.9 ± 0.5	1.028 ± 0.024	-
238U (n,f)/238U (n,f)	0.76 ± 0.11	0.628 ± 0.006	-
238U χ/238U χ	0.6 ± 0.3	0.399 ± 0.012	-
239Pu χ/239Pu χ	0.6 ± 0.7	-	-
238U (n,n)/238U (n,n')	-	-0.66 ± 0.03	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.35 ± 0.05	0.3407 ± 0.0016	-
238U (n,n)/238U (n,f)	-	0.490 ± 0.020	-
238U (n,f)/238U (n,γ)	-	0.2739 ± 0.0014	-
JENDL-4.0u			
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.0637 ± 0.0004	0.0684 ± 0.0003	0.066
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.241 ± 0.007	1.1760 ± 0.0017	1.191
238U (n,n')/238U (n,n')	2.3 ± 0.6	1.802 ± 0.009	1.712
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.340 ± 0.005	1.3439 ± 0.0009	1.347
ENDF/B-VIII.0			
238U (n,n)/238U (n,n')	1.0 ± 0.5	-0.70 ± 0.03	-
238U (n,n')/238U (n,n')	0.7 ± 0.3	0.451 ± 0.005	-
238U (n,n')/238U (n,f)	-0.7 ± 0.2	-0.633 ± 0.008	-
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.482 ± 0.003	0.4563 ± 0.0007	-
238U χ/238U χ	0.48 ± 0.15	0.369 ± 0.005	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.39 ± 0.04	0.3652 ± 0.0004	-
238U $\bar{\nu}$/238U $\bar{\nu}$	0.36 ± 0.04	0.3185 ± 0.0024	-
239Pu χ/239Pu χ	-	0.303 ± 0.007	-
238U (n,f)/238U (n,f)	0.35 ± 0.04	0.3008 ± 0.0024	-
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.27 ± 0.06	-0.2703 ± 0.0010	-
238U (n,n)/238U (n,n)	-	0.263 ± 0.023	-
238U (n,n')/238U (n,γ)	-	0.2561 ± 0.0005	-
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.26 ± 0.03	0.23285 ± 0.00010	-

C.3 HEU-MET-FAST-028

Table C.3.1: ISCs for the multiplication factor of HEU-MET-FAST-028.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.91737 ± 0.00024
235U $\bar{\nu}_p$	0.91160 ± 0.00024
235U (n,f)	0.5745 ± 0.0003
235U (n,n')	0.03372 ± 0.00017
235U (n,γ)	-0.052022 ± 0.000023
238U (n,n')	0.06309 ± 0.00018
238U (n,n)	0.1454 ± 0.0004

Table C.3.2: ISCs for the delayed neutron fraction of HEU-MET-FAST-028.

Quantity	ISCs for the delayed neutron fraction.		
	Bretscher	Chiba	Kodeli, [1]
235U $\bar{\nu}_d$	0.8269 ± 0.0007	0.8405 ± 0.0015	0.8360
235U $\bar{\nu}_p$	-0.85 ± 0.05	-0.8403 ± 0.0024	-0.8430
238U $\bar{\nu}_d$	0.1601 ± 0.0003	0.1391 ± 0.0004	0.1530
238U $\bar{\nu}_p$	-0.130 ± 0.013	-0.1329608 ± 0.0000019	-0.1400
235U χ	0.00 ± 0.05	0.000 ± 0.006	-
235U (n,f)	-0.09 ± 0.05	-0.053 ± 0.007	-
238U (n,n)	0.17 ± 0.09	0.040 ± 0.014	-

Table C.3.3: Reaction contribution to multiplication factor uncertainty of [name reactor]. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (68.7%)	
235U (n,f)/235U (n,f)	0.7117 ± 0.0005
235U (n,n')/235U (n,f)	0.5356 ± 0.0013
235U (n,γ)/235U (n,γ)	0.47924 ± 0.00020
JENDL-4.0u (71.1%)	
238U (n,n')/238U (n,n')	0.4041 ± 0.0016
238U (n,n)/238U (n,n)	0.3642 ± 0.0013
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.33225 ± 0.00007
ENDF/B-VIII.0 (74.1%)	
235U (n,f)/235U (n,f)	0.6917 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.52640 ± 0.00010
238U (n,n)/238U (n,n')	0.3942 ± 0.0010

Table C.3.4: Reaction contribution to delayed neutron fraction uncertainty of [name reactor]. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
235U χ/235U χ	0.9 ± 0.3	0.454 ± 0.007	-
235U (n,f)/235U (n,f)	0.59 ± 0.10	0.659 ± 0.005	-
238U (n,n)/238U (n,n)	0.58 ± 0.15	-	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.42 ± 0.03	0.4185 ± 0.0006	-
JENDL-4.0u			
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.3856 ± 0.0022	2.4829 ± 0.0013	2.403
238U (n,n)/238U (n,n)	1.6 ± 0.4	-	-
ENDF/B-VIII.0			
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.886 ± 0.003	3.9503561 ± 0.0019	-

C.4 U233-MET-FAST-006

Table C.4.1: ISCs for the multiplication factor of U233-MET-FAST-006.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
233U $\bar{\nu}$	0.91126 ± 0.00025
233U $\bar{\nu}_p$	0.90864 ± 0.00024
233U (n,f)	0.5910 ± 0.0003
235U (n,f)	0.006918 ± 0.000023
238U (n,n')	0.07156 ± 0.00017
238U (n,n)	0.1317 ± 0.0004

Table C.4.2: ISCs for the delayed neutron fraction of U233-MET-FAST-006.

Quantity	ISCs for the delayed neutron fraction.		
	Bretscher	Chiba	Kodeli, [1]
233U (n,f)	-0.20 ± 0.10	-0.228 ± 0.011	-0.2310
233U $\bar{\nu}_d$	0.6972 ± 0.0019	0.6919 ± 0.0014	0.7000
233U $\bar{\nu}_p$	-0.88 ± 0.09	-0.868 ± 0.006	-0.8850
233U $\bar{\nu}$	-0.19 ± 0.09	-0.176 ± 0.010	-0.1850
238U (n,n')	-0.19 ± 0.06	-0.119 ± 0.005	-0.1290
238U (n,f)	0.16 ± 0.03	0.163 ± 0.003	0.1670
238U $\bar{\nu}_d$	0.2886 ± 0.0013	0.2666 ± 0.0008	0.2740
238U $\bar{\nu}_p$	-0.136 ± 0.025	-0.103651 ± 0.000016	-0.1040

Table C.4.3: Reaction contribution to multiplication factor uncertainty of U233-MET-FAST-006. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (74.1%)	
235U (n,f)/235U (n,f)	0.5632 ± 0.0003
238U (n,n')/238U (n,n')	0.5028 ± 0.0012
238U (n,n)/238U (n,n')	0.3175 ± 0.0011
JENDL-4.0u (75.2%)	
233U $\bar{\nu}$/233U $\bar{\nu}_p$	0.62837 ± 0.00013
238U (n,n')/238U (n,n')	0.4518 ± 0.0013
233U $\bar{\nu}$/233U $\bar{\nu}$	0.44474 ± 0.00013
ENDF/B-VIII.0 (%)	
233U $\bar{\nu}$/233U $\bar{\nu}_p$	0.62837 ± 0.00013
233U $\bar{\nu}$/233U $\bar{\nu}$	0.44474 ± 0.00013
233U $\bar{\nu}_p$/233U $\bar{\nu}_p$	0.44431 ± 0.00013

Table C.4.4: Reaction contribution to delayed neutron fraction uncertainty of U233-MET-FAST-006. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
233U $\bar{\nu}_d$/233U $\bar{\nu}_d$	6.597 ± 0.018	6.576 ± 0.004	
JENDL-4.0u			
233U $\bar{\nu}_d$/233U $\bar{\nu}_d$	5.213 ± 0.015	5.201 ± 0.003	5.097
ENDF/B-VIII.0			
233U $\bar{\nu}_d$/233U $\bar{\nu}_d$	5.213 ± 0.015	5.2011 ± 0.0031	-

C.5 IEU-MET-FAST-007

Table C.5.1: ISCs for the multiplication factor of IEU-MET-FAST-007.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.75371 ± 0.00020
235U $\bar{\nu}_p$	0.74966 ± 0.00020
235U (n,f)	0.50260 ± 0.00022
235U χ	0.00000 ± 0.00020
238U (n,γ)	-0.23059 ± 0.00007
238U (n,n')	-0.0862 ± 0.0004
238U (n,n)	0.1104 ± 0.0009

Table C.5.2: ISCs for the delayed neutron fraction of IEU-MET-FAST-007.

Quantity	ISCs for the delayed neutron fraction.		
	Bretscher	Chiba	Kodeli, [1]
235U $\bar{\nu}_d$	0.54272 ± 0.00048	0.5678 ± 0.0011	0.548
235U $\bar{\nu}_p$	-0.51 ± 0.04	-0.5301 ± 0.0009	-0.516
238U $\bar{\nu}_d$	0.4420 ± 0.0006	0.3907 ± 0.0007	0.443
238U $\bar{\nu}_p$	-0.478 ± 0.022	-0.426344 ± 0.000004	-0.473
238U (n,n')	-0.07 ± 0.07	-0.040 ± 0.006	-
235U (n,f)	0.04 ± 0.04	0.017 ± 0.006	-
235U χ	0.00 ± 0.04	0.000 ± 0.004	-

Table C.5.3: Reaction contribution to multiplication factor uncertainty of IEU-MET-FAST-007. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (83.7%)	
235U (n,f)/235U (n,f)	1.0732 ± 0.0005
235U χ/235U χ	0.8595 ± 0.0015
238U (n,γ)/238U (n,γ)	0.61137 ± 0.00014
JENDL-4.0u (87.7%)	
238U (n,n')/238U (n,n')	1.0055 ± 0.0021
235U χ/235U χ	0.5385 ± 0.0009
238U (n,γ)/238U (n,γ)	0.40847 ± 0.00016
ENDF/B-VIII.0 (50.6%)	
235U (n,f)/235U (n,f)	0.6073 ± 0.0003
238U (n,n)/238U (n,n')	-0.444 ± 0.003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.43860 ± 0.00008

Table C.5.4: Reaction contribution to delayed neutron fraction uncertainty of IEU-MET-FAST-007. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
238U (n,n')/238U (n,n')	0.5 ± 0.5	0.311 ± 0.019	-
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.447 ± 0.021	0.405068 ± 0.000003	-
235U (n,f)/235U (n,f)	0.39 ± 0.10	0.317 ± 0.006	-
235U χ/235U χ	0.22 ± 0.25	0.406 ± 0.009	-
JENDL-4.0u			
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	1.8640 ± 0.0018	1.9739 ± 0.0011	1.8570
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.4815 ± 0.0021	1.3102 ± 0.0011	-
238U (n,n)/238U (n,n)	1.3 ± 0.8	-	-
ENDF/B-VIII.0			
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.5508 ± 0.0023	2.6686 ± 0.0014	-

C.6 HEU-MET-INTER-001

Table C.6.1: ISCs for the multiplication factor of [name reactor].

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.9971 ± 0.0004
235U $\bar{\nu}_p$	0.9903 ± 0.0004
235U (n,f)	0.5177 ± 0.0004
235U (n,n')	0.00999 ± 0.00016
235U (n,n)	0.0124 ± 0.0005

Table C.6.2: ISCs for the delayed neutron fraction of [name reactor].

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.9904 ± 0.0012	0.988 ± 0.003
235U $\bar{\nu}_p$	-0.99 ± 0.07	0.986 ± 0.000
57Fe (n,n)	0.04 ± 0.12	0.006 ± 0.016
56Fe (n,n)	0.4 ± 0.5	-0.04 ± 0.04
54Fe (n,n)	0.01 ± 0.18	0.013 ± 0.024
235U χ	0.000 ± 0.071	0.000 ± 0.003

Table C.6.3: Reaction contribution to multiplication factor uncertainty of [name reactor]. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (83.8%)	
235U (n,n')/235U (n,n')	0.6995 ± 0.0015
235U (n,n')/235U (n,f)	0.6982 ± 0.0009
235U (n,f)/235U (n,f)	0.6578 ± 0.0004
JENDL-4.0u (79.7%)	0.6582 ± 0.0015
235U (n,n')/235U (n,n')	0.4425 ± 0.0015
235U (n,n)/235U (n,n)	0.38196 ± 0.00007
235U $\bar{\nu}$/235U $\bar{\nu}_p$	
ENDF/B-VIII.0 (73.4%)	
235U (n,f)/235U (n,f)	0.7855 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}$	0.56366 ± 0.00010
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.39965 ± 0.00010

Table C.6.4: Reaction contribution to delayed neutron fraction uncertainty of [name reactor]. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
57Fe (n,n)/57Fe (n,n)	1.8 ± 1.0	-
56Fe (n,n)/56Fe (n,n)	1.7 ± 1.2	-
54Fe (n,n)/54Fe (n,n)	1.2 ± 0.4	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.54 ± 0.04	0.54 ± 0.00
235U χ/235U χ	-	0.178 ± 0.007
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.627 ± 0.004	2.6274 ± 0.0018
56Fe (n,n)/56Fe (n,n)	2.1 ± 1.2	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	4.549 ± 0.006	4.536 ± 0.003

C.7 PU-MET-INTER-002

Table C.7.1: ISCs for the multiplication factor of PU-MET-INTER-002.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.9891 ± 0.0004
239Pu $\bar{\nu}_p$	0.9868 ± 0.0004
239Pu (n,f)	0.5811 ± 0.0004
239Pu (n,γ)	-0.18717 ± 0.00007
56Fe (n,n)	0.0948 ± 0.0019
56Fe (n,γ)	-0.04259 ± 0.00004
52Cr(n,n)	0.0320 ± 0.0008

Table C.7.2: ISCs for the delayed neutron fraction of PU-MET-INTER-002.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
56Fe (n,n)	1.6 ± 1.1	-0.13 ± 0.09
239Pu $\bar{\nu}_d$	0.972 ± 0.003	0.976 ± 0.004
58Ni (n,n)	-1.5 ± 0.5	0.07 ± 0.10
239Pu $\bar{\nu}_p$	-1.0 ± 0.2	-1.0 ± 0.0
57Fe (n,n)	0.0 ± 0.2	-0.013 ± 0.013
54Fe (n,n)	0.2 ± 0.4	0.02 ± 0.03
239Pu (n,γ)	-0.03 ± 0.04	-0.0462 ± 0.0002
52Cr(n,n)	0.2 ± 0.5	0.04 ± 0.09
55Mn(n,n)	-0.2 ± 0.4	0.00 ± 0.03

Table C.7.3: Reaction contribution to multiplication factor uncertainty of PU-MET-INTER-002. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (92.2%)	
239Pu (n,γ)/239Pu (n,γ)	0.8499 ± 0.0005
239Pu (n,f)/239Pu (n,f)	0.7168 ± 0.0008
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.46022 ± 0.00017
JENDL-4.0u (76.3%)	
56Fe (n,n)/56Fe (n,n)	0.392 ± 0.007
56Fe (n,γ)/56Fe (n,γ)	0.3447 ± 0.0003
239Pu (n,γ)/239Pu (n,γ)	0.32108 ± 0.00006
ENDF/B-VIII.0 (78.2%)	
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.26807 ± 0.00010
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.26745 ± 0.00010
52Cr(n,n)/52Cr(n,n)	0.211 ± 0.005

Table C.7.4: Reaction contribution to delayed neutron fraction uncertainty of PU-MET-INTER-002. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
56Fe (n,n)/56Fe (n,n)	5.5 ± 2.4	0.39 ± 0.04
57Fe (n,n)/57Fe (n,n)	4.7 ± 1.4	-
58Ni (n,n)/58Ni (n,n)	4.3 ± 1.5	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.44 ± 0.10	0.45 ± 0.00
54Fe (n,n)/54Fe (n,n)	-	0.24 ± 0.06
239Pu (n,γ)/239Pu (n,γ)	-	0.2278 ± 0.0013
JENDL-4.0u		
56Fe (n,n)/56Fe (n,n)	9.1 ± 4.7	-
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	4.737 ± 0.014	4.789 ± 0.004
52Cr(n,n)/52Cr(n,n)	3.1 ± 1.9	-
ENDF/B-VIII.0		
58Ni (n,n)/58Ni (n,n)	5.4 ± 1.9	0.29 ± 0.10
56Fe (n,n)/56Fe (n,n)	3.1 ± 1.6	0.255 ± 0.024
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.28 ± 0.06	0.26 ± 0.00
55Mn (n,n)/55Mn (n,n)	2.8 ± 1.7	-
52Cr(n,n)/52Cr(n,n)	-	0.24 ± 0.14

C.8 PU-MET-INTER-004

Table C.8.1: ISCs for the multiplication factor of PU-MET-INTER-004.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.9830 ± 0.0004
239Pu $\bar{\nu}_p$	0.9806 ± 0.0004
239Pu (n,f)	0.5766 ± 0.0004
239Pu (n,γ)	-0.15062 ± 0.00007
208Pb (n,n)	0.1514 ± 0.0010

Table C.8.2: ISCs for the delayed neutron fraction of PU-MET-INTER-004.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
207Pb (n,n)	1.0 ± 0.4	-0.03 ± 0.04
239Pu $\bar{\nu}_d$	0.964 ± 0.003	0.968 ± 0.004
206Pb (n,n)	-0.6 ± 0.4	0.00 ± 0.05
239Pu $\bar{\nu}_p$	-0.97 ± 0.21	-0.96938 ± 0.00005
56Fe (n,n)	-0.3 ± 0.4	-0.0015 ± 0.0024
54Fe (n,n)	-0.15 ± 0.15	0.000 ± 0.016
57Fe (n,n)	0.06 ± 0.09	0.001 ± 0.011
239Pu χ	0.00 ± 0.20	0.000 ± 0.011
58Ni (n,n)	-0.33 ± 0.18	0.02 ± 0.03
206Pb (n,n)	-0.6 ± 0.4	0.00 ± 0.05
239Pu (n,γ)	-0.10 ± 0.04	-0.06826 ± 0.00006
239Pu (n,n)	-0.4 ± 0.3	0.02 ± 0.04
52Cr (n,n)	0.06 ± 0.17	-0.027 ± 0.009

Table C.8.3: Reaction contribution to multiplication factor uncertainty of PU-MET-INTER-004. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (88.6%)	
239Pu (n,γ)/239Pu (n,γ)	0.5815 ± 0.0004
239Pu (n,f)/239Pu (n,f)	0.4796 ± 0.0006
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.45104 ± 0.00017
JENDL-4.0u (79.7%)	
208Pb (n,n)/208Pb (n,n)	0.339 ± 0.003
239Pu (n,γ)/239Pu (n,γ)	0.33351 ± 0.00007
239Pu (n,f)/239Pu (n,f)	0.29564 ± 0.00021
ENDF/B-VIII.0 (79.2%)	
208Pb (n,n)/208Pb (n,n)	0.359 ± 0.003
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.26492 ± 0.00010
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.26427 ± 0.00010

Table C.8.4: Reaction contribution to delayed neutron fraction uncertainty of PU-MET-INTER-004. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
56Fe (n,n)/56Fe (n,n)	2.5 ± 0.9	-
54Fe (n,n)/54Fe (n,n)	1.6 ± 0.7	-
57Fe (n,n)/57Fe (n,n)	1.4 ± 0.5	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.43 ± 0.10	0.434739 ± 0.000022
239Pu χ/239Pu χ	-	0.427 ± 0.020
58Ni (n,n)/58Ni (n,n)	0.9 ± 0.5	-
207Pb (n,n)/207Pb (n,n)	1.2 ± 0.5	-
206Pb (n,n)/206Pb (n,n)	0.9 ± 0.4	-
239Pu (n,γ)/239Pu (n,γ)	-	0.281800 ± 0.000011
JENDL-4.0u		
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	4.054 ± 0.012	4.133 ± 0.004
56Fe (n,n)/56Fe (n,n)	2.3 ± 1.3	-
239Pu (n,n)/239Pu (n,n)	1.3 ± 0.8	-
207Pb (n,n)/207Pb (n,n)	1.20 ± 0.45	-
ENDF/B-VIII.0		
207Pb (n,n)/207Pb (n,n)	4.9 ± 1.7	0.16 ± 0.05
206Pb (n,n)/206Pb (n,n)	2.6 ± 1.6	-
239Pu χ/239Pu χ	1.0 ± 0.4	0.326 ± 0.020
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.28 ± 0.05	0.270467 ± 0.000011
52Cr (n,n)/52Cr (n,n)	-	0.162 ± 0.020

C.9 LEU-COMP-THERM-006

Table C.9.1: ISCs for the multiplication factor of LEU-COMP-THERM-006.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.94195 ± 0.00010
235U $\bar{\nu}_p$	0.93508 ± 0.00010
235U (n,f)	0.33033 ± 0.00017
1H (n,γ)	-0.13192 ± 0.00004
235U χ	0.00000 ± 0.00016

Table C.9.2: ISCs for the delayed neutron fraction of LEU-COMP-THERM-006.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.8590 ± 0.0012	0.8656 ± 0.0007
235U $\bar{\nu}_p$	-0.884 ± 0.019	-0.875 ± 0.000
235U χ	0.000 ± 0.028	0.0000 ± 0.0033

Table C.9.3: Reaction contribution to multiplication factor uncertainty of LEU-COMP-THERM-006. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (80.3%)	
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.52475 ± 0.00006
1H (n,γ)/1H (n,γ)	0.33685 ± 0.00011
235U χ/235U χ	0.3203 ± 0.0010
JENDL-4.0u (75.6%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.39669 ± 0.00003
235U $\bar{\nu}$/235U $\bar{\nu}$	0.28127 ± 0.00003
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.28039 ± 0.00003
ENDF/B-VIII.0 (88.3%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.61254 ± 0.00005
235U $\bar{\nu}$/235U $\bar{\nu}$	0.43411 ± 0.00005
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.43300 ± 0.00005

Table C.9.4: Reaction contribution to delayed neutron fraction uncertainty of LEU-COMP-THERM-006. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.496 ± 0.011	0.491 ± 0.000
235U χ/235U χ	0.28 ± 0.17	0.273 ± 0.009
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.701 ± 0.004	2.7234 ± 0.0008
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.753 ± 0.006	3.7840 ± 0.0011

C.10 LEU-COMP-THERM-067

Table C.10.1: ISCs for the multiplication factor of LEU-COMP-THERM-067.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.9611 ± 0.0004
235U $\bar{\nu}_p$	0.9541 ± 0.0004
235U (n,f)	0.3652 ± 0.0005
235U χ	0.0000 ± 0.0005
1H (n,γ)	-0.11617 ± 0.00006

Table C.10.2: ISCs for the delayed neutron fraction of LEU-COMP-THERM-067.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.897 ± 0.004	0.9043 ± 0.0010
235U $\bar{\nu}_p$	-0.89 ± 0.06	-0.91 ± 0.00
56Fe (n,n)	0.08 ± 0.08	-0.006 ± 0.012
16O (n,n)	-0.13 ± 0.16	-0.034 ± 0.016
238U (n,n)	-0.17 ± 0.09	0.006 ± 0.019
1H (n,n)	-0.3 ± 0.3	-0.12 ± 0.03
235U χ	0.00 ± 0.07	0.000 ± 0.008

Table C.10.3: Reaction contribution to multiplication factor uncertainty of LEU-COMP-THERM-067. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (79.0%)	
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.53539 ± 0.00022
235U χ/235U χ	0.365 ± 0.003
1H (n,γ)/1H (n,γ)	0.3032 ± 0.0003
JENDL-4.0u (74.3%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.40384 ± 0.00012
235U $\bar{\nu}$/235U $\bar{\nu}$	0.28635 ± 0.00012
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.28544 ± 0.00012
ENDF/B-VIII.0 (87.8%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.62436 ± 0.00018
235U $\bar{\nu}$/235U $\bar{\nu}$	0.44249 ± 0.00018
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.44137 ± 0.00018

Table C.10.4: Reaction contribution to delayed neutron fraction uncertainty of LEU-COMP-THERM-067. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.50 ± 0.03	0.51 ± 0.00
56Fe (n,n)/56Fe (n,n)	0.25 ± 0.12	-
16O (n,n)/16O (n,n)	0.2 ± 0.3	-
238U (n,n)/238U (n,n)	0.22 ± 0.13	-
1H (n,n)/1H (n,n)	0.18 ± 0.14	-
235U χ/235U χ	0.2 ± 0.4	-
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.822 ± 0.013	2.8475 ± 0.0013
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.911 ± 0.018	3.9462 ± 0.0018

C.11 HEU-MET-FAST-001

Table C.11.1: ISCs for the multiplication factor of HEU-MET-FAST-001.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.98291 ± 0.00025
235U $\bar{\nu}_p$	0.97665 ± 0.00025
235U (n,f)	0.6523 ± 0.0003
235U (n,n')	0.08179 ± 0.00017
235U (n,n)	0.1091 ± 0.0003

Table C.11.2: ISCs for the delayed neutron fraction of HEU-MET-FAST-001.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.9544 ± 0.0009	0.9698 ± 0.0016
235U $\bar{\nu}_p$	-0.95 ± 0.06	-0.966 ± 0.004
235U (n,f)	-0.07 ± 0.06	-0.054 ± 0.007
235U χ	0.00 ± 0.05	0.000 ± 0.005
235U (n,n')	0.02 ± 0.04	-0.008 ± 0.003

Table C.11.3: Reaction contribution to multiplication factor uncertainty of HEU-MET-FAST-001. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (87.5%)
JEFF-3.3 (%)	
235U (n,n')/235U (n,n')	0.6995 ± 0.0015
235U (n,n')/235U (n,f)	0.6982 ± 0.0009
235U (n,f)/235U (n,f)	0.6578 ± 0.0004
JENDL-4.0u (82.9%)	
235U (n,n')/235U (n,n')	0.6582 ± 0.0015
235U (n,n)/235U (n,n)	0.4425 ± 0.0015
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.38196 ± 0.00007
ENDF/B-VIII.0 (83.4%)	
235U (n,f)/235U (n,f)	0.7855 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.56366 ± 0.00010
235U $\bar{\nu}$/235U $\bar{\nu}$	0.39965 ± 0.00010

Table C.11.4: Reaction contribution to delayed neutron fraction uncertainty of HEU-MET-FAST-001. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U (n,f)/235U (n,f)	0.81 ± 0.10	0.839 ± 0.005
235U χ/235U χ	0.7 ± 0.4	0.918 ± 0.007
235U (n,n')/235U (n,f)	0.8 ± 0.3	-
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.6258 ± 0.0025	2.7300 ± 0.0013
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	4.486 ± 0.004	4.5580 ± 0.0021

C.12 MIX-COMP-FAST-005

Table C.12.1: ISCs for the multiplication factor of MIX-COMP-FAST-005.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.7896 ± 0.0003
239Pu $\bar{\nu}_p$	0.7881 ± 0.0003
239Pu (n,f)	0.5703 ± 0.0003
239Pu χ	(0.0000 ± 0.0003)
238U (n,n')	-0.0554 ± 0.0003
238U (n,γ)	-0.21390 ± 0.00006
238U $\bar{\nu}$	0.15585 ± 0.00010
238U $\bar{\nu}_p$	0.15366 ± 0.00010

Table C.12.2: ISCs for the delayed neutron fraction of MIX-COMP-FAST-005.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
238U $\bar{\nu}_d$	0.5640 ± 0.0014	0.5265 ± 0.0012
239Pu $\bar{\nu}_d$	$\pm 0.3756 \pm 0.0005$	0.3816 ± 0.0012
239Pu $\bar{\nu}_p$	-0.58 ± 0.10	-0.62597 ± 0.00007
56Fe (n,n)	-0.36 ± 0.23	0.00 ± 0.03
238U $\bar{\nu}_p$	-0.34 ± 0.04	-0.278600 ± 0.000006
238U (n,n)	0.2 ± 0.4	-0.02 ± 0.03
238U (n,n')	-0.27 ± 0.12	-0.105 ± 0.005
238U (n,f)	0.27 ± 0.04	0.289 ± 0.005
57Fe (n,n)	-0.05 ± 0.05	0.004 ± 0.005
239Pu χ	0.00 ± 0.09	0.000 ± 0.008
240Pu (n,n')	-0.025 ± 0.013	0.0000 ± 0.0013
238U χ	0.00 ± 0.03	0.000 ± 0.004
23Na (n,n)	0.00 ± 0.23	-0.01 ± 0.03
58Ni (n,n)	-0.16 ± 0.10	-0.002 ± 0.013
238U $\bar{\nu}$	0.22 ± 0.04	0.2479 ± 0.0044

Table C.12.3: Reaction contribution to multiplication factor uncertainty of MIX-COMP-FAST-005. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (74.7%)	
239Pu χ/239Pu χ	0.5245 ± 0.0017
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.36367 ± 0.00013
238U (n,n')/238U (n,n')	0.3565 ± 0.0024
JENDL-4.0u (79.2%)	
238U (n,n')/238U (n,n')	0.5074 ± 0.0022
239Pu χ/239Pu χ	0.3612 ± 0.0010
238U (n,γ)/238U (n,γ)	0.35855 ± 0.00010
ENDF/B-VIII.0 (73.5%)	
238U (n,γ)/238U (n,γ)	0.28142 ± 0.00007
238U $\bar{\nu}$/238U $\bar{\nu}_p$	0.27004 ± 0.00012
239Pu χ/239Pu χ	0.2372 ± 0.0007

Table C.12.4: Reaction contribution to delayed neutron fraction uncertainty of MIX-COMP-FAST-005. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
238U (n,n)/238U (n,n')	-1.8784 ± 0.8349	-
238U (n,n')/238U (n,n')	1.7 ± 0.9	0.701 ± 0.020
238U (n,n')/238U (n,f)	-1.2 ± 0.3	-0.819 ± 0.010
56Fe (n,n)/56Fe (n,n)	1.1 ± 0.5	-
238U (n,n)/238U (n,f)	1.1 ± 0.4	-
238U (n,n)/238U (n,n)	1.1 ± 0.8	-
57Fe (n,n)/57Fe (n,n)	0.9 ± 0.3	-
238U (n,f)/238U (n,f)	0.66 ± 0.11	0.701 ± 0.006
239Pu χ/239Pu χ	0.6 ± 0.6	0.97 ± 0.03
240Pu(n,n')/240Pu(n,n')	0.46 ± 0.20	-
JENDL-4.0u		
238U (n,n')/238U (n,n')	2.2 ± 0.8	1.157 ± 0.004
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.895 ± 0.005	1.7689 ± 0.0019
56Fe (n,n)/56Fe (n,n)	1.7 ± 0.8	-
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.5127 ± 0.0022	1.5671 ± 0.0015
ENDF/B-VIII.0		
238U (n,n)/238U (n,n')	-1.5 ± 0.9	-
23Na (n,n)/23Na (n,n)	1.3 ± 0.9	-
238U (n,n)/238U (n,n)	1.0 ± 0.4	-
238U (n,n')/238U (n,f)	-0.86 ± 0.22	-0.553 ± 0.009
238U (n,n')/238U (n,n')	0.8 ± 0.6	-
58Ni (n,n)/58Ni (n,n)	0.8 ± 0.3	-
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.7315 ± 0.0018	0.6826 ± 0.0008
56Fe (n,n)/56Fe (n,n)	0.7 ± 0.4	-
239Pu χ/239Pu χ	0.59 ± 0.21	0.605 ± 0.008
238U χ/238U χ	0.51 ± 0.12	0.521 ± 0.004
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.49 ± 0.05	-0.4674 ± 0.0019
238U (n,f)/238U (n,f)	0.33 ± 0.05	0.354 ± 0.003
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.43 ± 0.05	0.3462279200.000000027
238U $\bar{\nu}$/238U $\bar{\nu}$	0.29 ± 0.04	0.318 ± 0.003

C.13 IEU-MET-FAST-010

Table C.13.1: ISCs for the multiplication factor of IEU-MET-FAST-010.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.7513 ± 0.0004
235U $\bar{\nu}_p$	0.7473 ± 0.0004
235U (n,f)	0.5110 ± 0.0004
235U χ	0.0000 ± 0.0004
238U (n,n')	-0.1102 ± 0.0007
238U (n,γ)	-0.26595 ± 0.00012

Table C.13.2: ISCs for the delayed neutron fraction of IEU-MET-FAST-010.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.5362 ± 0.0009	0.5627 ± 0.0019
238U $\bar{\nu}_d$	0.4483 ± 0.0012	0.3960 ± 0.0011
235U $\bar{\nu}_p$	-0.56 ± 0.07	-0.5247 ± 0.0012
238U $\bar{\nu}_p$	-0.42 ± 0.04	-0.43221 ± 0.0000021
235U χ	0.00 ± 0.07	0.000 ± 0.007
56Fe (n,n)	0.04 ± 0.09	-0.007 ± 0.007
238U (n,n')	0.05 ± 0.13	-0.048 ± 0.003
235U (n,f)	-0.03 ± 0.07	0.022 ± 0.012
238U (n,f)	0.11 ± 0.04	0.043 ± 0.003
238U (n,n)	0.3 ± 0.3	-0.02 ± 0.03

Table C.13.3: Reaction contribution to multiplication factor uncertainty of IEU-MET-FAST-010. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (84.4%)	
235U (n,f)/235U (n,f)	1.1542 ± 0.0010
235U χ/235U χ	0.849 ± 0.003
238U (n,n')/238U (n,n')	0.674 ± 0.005
JENDL-4.0u (90.0%)	
238U (n,n')/238U (n,n')	1.092 ± 0.004
235U χ/235U χ	0.5425 ± 0.0016
238U (n,γ)/238U (n,γ)	0.4715 ± 0.0003
ENDF/B-VIII.0 (71.3%)	
235U (n,f)/235U (n,f)	0.6174 ± 0.0005
238U (n,γ)/238U (n,γ)	0.44343 ± 0.00019
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.44167 ± 0.00016

Table C.13.4: Reaction contribution to delayed neutron fraction uncertainty of IEU-MET-FAST-010. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U χ/235U χ	0.9 ± 0.5	0.436 ± 0.017
56Fe (n,n)/56Fe (n,n)	0.6 ± 0.3	-
238U (n,n')/238U (n,n')	0.5 ± 0.6	-
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.41 ± 0.04	0.4119624 ± 0.0000018
238U (n,n')/238U (n,f)	0.4 ± 0.4	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.30 ± 0.04	0.2815 ± 0.0004
235U (n,f)/235U (n,f)	0.19 ± 0.16	0.279 ± 0.010
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	1.852 ± 0.004	1.9601 ± 0.0021
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.504 ± 0.004	1.3291 ± 0.0018
238U (n,n)/238U (n,n)	1.0 ± 1.0	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.520 ± 0.004	2.6444 ± 0.0025
238U (n,n)/238U (n,n)	1.0 ± 0.7	-

C.14 IEU-MET-FAST-020

Table C.14.1: ISCs for the multiplication factor of IEU-MET-FAST-020.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.82055 ± 0.00022
235U $\bar{\nu}_p$	0.81576 ± 0.00021
235U (n,f)	0.51909 ± 0.00023
235U χ	0.00000 ± 0.00021
235U (n,γ)	-0.061807 ± 0.000021
238U (n,n')	-0.0121 ± 0.0003

Table C.14.2: ISCs for the delayed neutron fraction of IEU-MET-FAST-020.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.6364 ± 0.0005	0.6569 ± 0.0012
238U $\bar{\nu}_d$	0.3498 ± 0.0005	0.3074 ± 0.0005
235U $\bar{\nu}_p$	-0.68 ± 0.04	-0.6513 ± 0.0003
238U $\bar{\nu}_p$	-0.346 ± 0.015	-0.310 ± 0.003
238U (n,n)	0.28 ± 0.12	0.016 ± 0.017
238U (n,n')	-0.07 ± 0.05	-0.042 ± 0.003
235U χ	0.00 ± 0.04	0.000 ± 0.003
235U (n,f)	-0.02 ± 0.04	-0.015 ± 0.007
65Cu (n,n)	-0.07 ± 0.07	-0.004 ± 0.009

Table C.14.3: Reaction contribution to multiplication factor uncertainty of IEU-MET-FAST-020. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (82.1%)	
235U (n,f)/235U (n,f)	1.0083 ± 0.0005
235U χ/235U χ	0.6366 ± 0.0015
235U (n,γ)/235U (n,γ)	0.54196 ± 0.00017
JENDL-4.0u (76.2%)	
238U (n,n')/238U (n,n')	0.4221 ± 0.0021
235U χ/235U χ	0.3877 ± 0.0009
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.27275 ± 0.00006
ENDF/B-VIII.0 (76.4%)	
235U (n,f)/235U (n,f)	0.6240 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.47772 ± 0.00009
235U (n,γ)/235U (n,γ)	0.36823 ± 0.00011

Table C.14.4: Reaction contribution to delayed neutron fraction uncertainty of IEU-MET-FAST-020. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
238U (n,n)/238U (n,n')	-0.7 ± 0.3	-
238U (n,n')/238U (n,n')	0.69 ± 0.23	0.305 ± 0.012
238U (n,n)/238U (n,n)	0.46 ± 0.22	-
235U χ/235U χ	0.5 ± 0.3	-
235U (n,f)/235U (n,f)	0.37 ± 0.10	0.318 ± 0.006
65Cu (n,n)/65Cu (n,n)	0.34 ± 0.23	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.334 ± 0.022	0.34344 ± 0.00017
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.331 ± 0.014	0.2954843 ± 0.0000011
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.0427 ± 0.0019	2.1378 ± 0.0012
238U (n,n')/238U (n,n')	1.5 ± 0.4	-
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.1732 ± 0.0017	1.0312 ± 0.0008
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.9898 ± 0.0025	3.0862 ± 0.0015

C.15 IEU-MET-FAST-021

Table C.15.1: ISCs for the multiplication factor of IEU-MET-FAST-021.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.79288 ± 0.00022
235U $\bar{\nu}_p$	0.78835 ± 0.00021
235U (n,f)	0.50595 ± 0.00023
235U χ	0.00000 ± 0.00020
235U (n,γ)	-0.056125 ± 0.000020
238U (n,n')	0.0068 ± 0.0003
238U (n,n)	0.1663 ± 0.0007

Table C.15.2: ISCs for the delayed neutron fraction of IEU-MET-FAST-021.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.5967 ± 0.0005	0.6202 ± 0.0011
238U $\bar{\nu}_d$	0.3891 ± 0.0005	0.3417 ± 0.0005
235U $\bar{\nu}_p$	-0.59 ± 0.04	-0.6003 ± 0.0010
238U $\bar{\nu}_p$	-0.391 ± 0.017	-0.358922 ± 0.0000019
238U (n,n')	-0.02 ± 0.06	-0.061 ± 0.004
235U (n,n')	0.029 ± 0.025	-0.0073 ± 0.0014
235U (n,f)	-0.03 ± 0.04	-0.007 ± 0.006

Table C.15.3: Reaction contribution to multiplication factor uncertainty of IEU-MET-FAST-021. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (76.7%)	
235U (n,f)/235U (n,f)	0.9753 ± 0.0005
235U χ/235U χ	0.7287 ± 0.0016
235U (n,γ)/235U (n,γ)	0.50639 ± 0.00017
JENDL-4.0u (81.4%)	
238U (n,n')/238U (n,n')	0.619 ± 0.003
235U χ/235U χ	0.4438 ± 0.0009
238U (n,n)/238U (n,n)	0.4280 ± 0.0023
ENDF/B-VIII.0 (68.7%)	
235U (n,f)/235U (n,f)	0.6108 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.45887 ± 0.00009
238U (n,n)/238U (n,n)	0.3974 ± 0.0017

Table C.15.4: Reaction contribution to delayed neutron fraction uncertainty of IEU-MET-FAST-021. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
238U (n,n')/238U (n,n')	0.40 ± 0.18	0.441 ± 0.014
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.374 ± 0.016	0.3415542 ± 0.0000012
235U (n,n')/235U (n,f)	0.35 ± 0.17	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.309 ± 0.022	0.31494 ± 0.00025
235U (n,f)/235U (n,f)	0.31 ± 0.09	0.345 ± 0.005
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	1.9651 ± 0.0018	2.0725 ± 0.0012
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.3050 ± 0.0018	1.1463 ± 0.0009
238U (n,n')/238U (n,n')	1.2 ± 0.6	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.8046 ± 0.0024	2.9148 ± 0.0015

C.16 IEU-MET-FAST-022

Table C.16.1: ISCs for the multiplication factor of IEU-MET-FAST-022.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.83795 ± 0.00022
235U $\bar{\nu}_p$	0.83295 ± 0.00022
235U (n,f)	0.52239 ± 0.00023
235U (n,γ)	-0.075864 ± 0.000019
235U χ	0.00000 ± 0.00021
238U (n,n')	-0.0131 ± 0.0003

Table C.16.2: ISCs for the delayed neutron fraction of IEU-MET-FAST-022.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.6601 ± 0.0005	0.6824 ± 0.0013
238U $\bar{\nu}_d$	0.3215 ± 0.0005	0.2835 ± 0.0005
235U $\bar{\nu}_p$	-0.67 ± 0.04	-0.682292 ± 0.000007
238U $\bar{\nu}_p$	-0.31 ± 0.05	$-0.28106570000 \pm 0.00000000009$
65Cu (n,n)	0.01 ± 0.07	-0.014 ± 0.006
235U (n,n')	-0.048 ± 0.022	-0.0061 ± 0.0010
238U (n,n')	-0.08 ± 0.05	-0.0399 ± 0.0014
235U (n,f)	-0.01 ± 0.04	-0.019 ± 0.008
235U χ	0.00 ± 0.04	0.000 ± 0.003

Table C.16.3: Reaction contribution to multiplication factor uncertainty of IEU-MET-FAST-022. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (83.5%)	
235U (n,f)/235U (n,f)	1.0932 ± 0.0006
235U (n,γ)/235U (n,γ)	0.62791 ± 0.00014
235U (n,f)/235U (n,γ)	0.61915 ± 0.00025
JENDL-4.0u (71.2%)	
235U χ/235U χ	0.3458 ± 0.0009
238U (n,n')/238U (n,n')	0.3187 ± 0.0019
235U (n,f)/235U (n,f)	0.27067 ± 0.00015
ENDF/B-VIII.0 (78.8%)	
235U (n,f)/235U (n,f)	0.6236 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.51176 ± 0.00010
235U (n,γ)/235U (n,γ)	0.41486 ± 0.00009

Table C.16.4: Reaction contribution to delayed neutron fraction uncertainty of IEU-MET-FAST-022. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
65Cu (n,n)/65Cu (n,n)	0.6 ± 0.5	-
235U (n,n')/235U (n,n')	0.56 ± 0.24	-
238U (n,n')/238U (n,n')	0.5 ± 0.3	0.283 ± 0.008
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.354 ± 0.023	0.363191 ± 0.000003
235U (n,f)/235U (n,f)	0.36 ± 0.10	0.285 ± 0.006
235U χ/235U χ	-	0.285 ± 0.009
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.0330 ± 0.0019	2.1247 ± 0.0012
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.0797 ± 0.0016	0.9521 ± 0.0008
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.1010 ± 0.0024	3.2059 ± 0.0016

C.17 FCA-XIX-1

Table C.17.1: ISCs for the multiplication factor of FCA-XIX-1.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.9760 ± 0.0004
235U $\bar{\nu}_p$	0.9688 ± 0.0004
235U (n,f)	0.4579 ± 0.0004
235U (n,γ)	-0.17544 ± 0.00005
235U χ	0.0000 ± 0.0004

Table C.17.2: ISCs for the delayed neutron fraction of FCA-XIX-1.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.9370 ± 0.0010	0.942 ± 0.003
0C (n,n)	-1.0 ± 0.3	-0.05 ± 0.05
235U $\bar{\nu}_p$	-0.95 ± 0.07	-0.94 ± 0.00
235U χ	0.00 ± 0.07	0.000 ± 0.006
55Mn (n,n)	0.09 ± 0.04	-0.003 ± 0.003
56Fe (n,n)	-0.04 ± 0.13	-0.008 ± 0.011
54Fe (n,n)	0.08 ± 0.05	-0.002 ± 0.006
235U (n,n)	-0.12 ± 0.09	0.002 ± 0.010

Table C.17.3: Reaction contribution to multiplication factor uncertainty of FCA-XIX-1. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (88.4%)	
235U (n,γ)/235U (n,γ)	0.86065 ± 0.00016
235U (n,f)/235U (n,f)	0.7891 ± 0.0008
235U (n,f)/235U (n,γ)	0.6020 ± 0.0007
JENDL-4.0u (84.0%)	
235U (n,γ)/235U (n,γ)	0.48213 ± 0.00021
235U (n,f)/235U (n,f)	0.4770 ± 0.0008
235U χ/235U χ	0.2656 ± 0.0015
ENDF/B-VIII.0 (82.9%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.81053 ± 0.00025
235U $\bar{\nu}$/235U $\bar{\nu}$	0.57412 ± 0.00025
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.57288 ± 0.00025

Table C.17.4: Reaction contribution to delayed neutron fraction uncertainty of FCA-XIX-1. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U χ/235U χ	1.0 ± 0.4	-
55Mn (n,n)/55Mn (n,n)	0.8 ± 0.3	-
56Fe (n,n)/56Fe (n,n)	0.6 ± 0.3	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.52 ± 0.04	0.51 ± 0.00
0C (n,n)/0C (n,n)	0.49 ± 0.16	-
54Fe (n,n)/54Fe (n,n)	0.5 ± 0.3	-
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.352 ± 0.003	2.3983 ± 0.0016
235U (n,n)/235U (n,n)	0.8 ± 0.6	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	4.261 ± 0.005	4.283 ± 0.003

C.18 FCA-XIX-2

Table C.18.1: ISCs for the multiplication factor of FCA-XIX-2.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.7968 ± 0.0003
239Pu $\bar{\nu}_p$	0.7952 ± 0.0003
239Pu (n,f)	0.5043 ± 0.0003
239Pu χ	0.0000 ± 0.0003
239Pu (n,γ)	-0.053534 ± 0.000025
238U (n,γ)	-0.14009 ± 0.00004

Table C.18.2: ISCs for the delayed neutron fraction of FCA-XIX-2.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
238U (n,n)	0.6 ± 0.3	-0.047 ± 0.007
239Pu $\bar{\nu}_d$	0.4391 ± 0.0008	0.4400 ± 0.0014
238U $\bar{\nu}_d$	0.3989 ± 0.0016	0.3718 ± 0.0009
239Pu $\bar{\nu}_p$	-0.71 ± 0.11	-0.71381 ± 0.00019
239Pu χ	0.00 ± 0.10	0.000 ± 0.009
56Fe (n,n)	0.1 ± 0.3	-0.038 ± 0.019
57Fe (n,n)	0.04 ± 0.06	0.002 ± 0.007
27Al (n,n)	-0.13 ± 0.20	0.002 ± 0.023
238U (n,n')	0.06 ± 0.12	-0.084 ± 0.006
238U (n,f)	0.25 ± 0.03	0.229 ± 0.003
52Cr (n,n)	-0.26 ± 0.13	0.009 ± 0.017
58Ni (n,n)	-0.07 ± 0.12	-0.005 ± 0.012
235U $\bar{\nu}_d$	0.1385 ± 0.0004	0.1415 ± 0.0011
238U $\bar{\nu}$	0.22 ± 0.03	0.198 ± 0.003
238U $\bar{\nu}_p$	-0.18 ± 0.03	-0.17388 ± 0.00003

Table C.18.3: Reaction contribution to multiplication factor uncertainty of FCA-XIX-2. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (73.7%)	
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.36529 ± 0.00013
239Pu (n,f)/239Pu (n,f)	0.27771 ± 0.00018
239Pu χ/239Pu χ	0.2692 ± 0.0017
JENDL-4.0u (69.8%)	
239Pu (n,f)/239Pu (n,f)	0.27318 ± 0.00016
239Pu (n,γ)/239Pu (n,γ)	0.23993 ± 0.00006
238U (n,γ)/238U (n,γ)	0.22751 ± 0.00007
ENDF/B-VIII.0 (74.8%)	
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.21612 ± 0.00008
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.21569 ± 0.00008
238U (n,γ)/238U (n,γ)	0.18848 ± 0.00005

Table C.18.4: Reaction contribution to delayed neutron fraction uncertainty of FCA-XIX-2. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
239Pu χ/239Pu χ	1.7 ± 0.7	0.69 ± 0.03
56Fe (n,n)/56Fe (n,n)	1.5 ± 0.9	-
238U (n,n)/238U (n,n)	1.1 ± 0.7	-
238U (n,n)/238U (n,f)	1.1 ± 0.4	-
57Fe (n,n)/57Fe (n,n)	1.1 ± 0.4	-
238U (n,n)/238U (n,n')	1.0 ± 0.9	-
27Al (n,n)/27Al (n,n)	0.8 ± 0.7	-
238U (n,n')/238U (n,f)	-	-0.647 ± 0.014
238U (n,n')/238U (n,n')	-	0.56 ± 0.03
238U (n,f)/238U (n,f)	0.63 ± 0.08	0.558 ± 0.005
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.32 ± 0.05	0.31988 ± 0.00007
JENDL-4.0u		
238U (n,n)/238U (n,n)	2.9 ± 1.5	-
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.585 ± 0.003	1.6233 ± 0.0015
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.341 ± 0.005	1.2499 ± 0.0015
239Pu χ/239Pu χ	1.1 ± 0.4	-
56Fe (n,n)/56Fe (n,n)	1.1 ± 0.6	-
238U (n,n')/238U (n,n')	-	0.8967 ± 0.0011
ENDF/B-VIII.0		
52Cr (n,n)/52Cr (n,n)	1.5 ± 0.8	-
238U (n,n)/238U (n,n)	1.2 ± 0.6	-
27Al (n,n)/27Al (n,n)	1.1 ± 1.0	-
56Fe (n,n)/56Fe (n,n)	0.8 ± 0.4	-
239Pu χ/239Pu χ	0.8 ± 0.3	0.432 ± 0.009
58Ni (n,n)/58Ni (n,n)	0.8 ± 0.6	-
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.6497 ± 0.0017	0.6639 ± 0.0012
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.5176 ± 0.0020	0.4822 ± 0.0006
238U (n,n')/238U (n,f)	-	-0.440 ± 0.011
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.36 ± 0.03	-0.3304 ± 0.0012
238U (n,f)/238U (n,f)	0.31 ± 0.03	0.2805 ± 0.0020
238U $\bar{\nu}$/238U $\bar{\nu}$	0.27 ± 0.03	0.2536 ± 0.0019
238U (n,n')/238U (n,n')	-	0.237 ± 0.013
238U (n,n)/238U (n,n')	-	0.237 ± 0.003

C.19 FCA-XIX-3

Table C.19.1: ISCs for the multiplication factor of FCA-XIX-3.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.9160 ± 0.0003
239Pu $\bar{\nu}_p$	0.9140 ± 0.0003
239Pu (n,f)	0.6030 ± 0.0003
56Fe (n,n)	0.0798 ± 0.0013
239Pu (n,γ)	-0.06421 ± 0.00003
52Cr (n,n)	0.0343 ± 0.0007

Table C.19.2: ISCs for the delayed neutron fraction of FCA-XIX-3.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
239Pu $\bar{\nu}_d$	0.774 ± 0.003	0.7669 ± 0.0025
52Cr (n,n)	0.3 ± 0.4	0.00 ± 0.03
239Pu $\bar{\nu}_p$	-0.96 ± 0.18	-0.8995 ± 0.0005
54Fe (n,n)	-0.54 ± 0.25	-0.007 ± 0.022
56Fe (n,n)	-0.4 ± 0.7	0.06 ± 0.11
57Fe (n,n)	0.30 ± 0.16	-0.011 ± 0.013
239Pu χ	0.00 ± 0.18	0.000 ± 0.017
238U (n,n')	0.03 ± 0.09	-0.028 ± 0.003
238U (n,f)	0.120 ± 0.024	0.066 ± 0.003
53Cr (n,n)	0.14 ± 0.23	-0.005 ± 0.012
58Ni (n,n)	0.2 ± 0.3	-0.049 ± 0.019
235U $\bar{\nu}_d$	0.1009 ± 0.0005	0.1008 ± 0.0013

Table C.19.3: Reaction contribution to multiplication factor uncertainty of FCA-XIX-3. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (81.2%)	
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.42018 ± 0.00015
239Pu (n,f)/239Pu (n,f)	0.32627 ± 0.00022
56Fe (n,n)/56Fe (n,n)	0.248 ± 0.003
JENDL-4.0u (78.8%)	
56Fe (n,n)/56Fe (n,n)	0.349 ± 0.005
239Pu (n,f)/239Pu (n,f)	0.32553 ± 0.00018
239Pu (n,γ)/239Pu (n,γ)	0.25056 ± 0.00007
ENDF/B-VIII.0 (78.5%)	
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.24739 ± 0.00009
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.24685 ± 0.00009
52Cr (n,n)/52Cr (n,n)	0.234 ± 0.004

Table C.19.4: Reaction contribution to delayed neutron fraction uncertainty of FCA-XIX-3. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
56Fe (n,n)/56Fe (n,n)	5.0 ± 2.2	0.27 ± 0.09
54Fe (n,n)/54Fe (n,n)	2.6 ± 0.9	-
57Fe (n,n)/57Fe (n,n)	2.4 ± 1.1	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.44 ± 0.08	0.40538 ± 0.00015
239Pu χ/239Pu χ	-	0.20 ± 0.05
238U (n,n')/238U (n,f)	-	-0.189 ± 0.006
238U (n,n')/238U (n,n')	-	0.189 ± 0.016
238U (n,f)/238U (n,f)	0.29 ± 0.06	0.156 ± 0.003
54Fe (n,n)/54Fe (n,n)	-	0.150 ± 0.010
JENDL-4.0u		
56Fe (n,n)/56Fe (n,n)	4.8 ± 2.0	-
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	2.608 ± 0.009	2.6300 ± 0.0024
ENDF/B-VIII.0		
56Fe (n,n)/56Fe (n,n)	2.4 ± 1.4	-
53Cr (n,n)/53Cr (n,n)	1.2 ± 0.7	-
52Cr (n,n)/52Cr (n,n)	1.1 ± 1.7	-
58Ni (n,n)/58Ni (n,n)	1.1 ± 1.0	0.18 ± 0.03
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.4721 ± 0.0022	0.4714 ± 0.0014
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.27 ± 0.05	0.24694 ± 0.00008

C.20 SNEAK-7A

Table C.20.1: ISCs for the multiplication factor of SNEAK-7A.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)	
	MCNP	Kodeli, [1]
239Pu (n,f)	0.5485 ± 0.0003	0.54
239Pu $\bar{\nu}_p$	0.7955 ± 0.0003	0.779
238U $\bar{\nu}_p$	0.13257 ± 0.00009	0.137
239Pu $\bar{\nu}$	0.7971 ± 0.0003	-
239Pu χ	0.0000 ± 0.0003	-
238U (n,γ)	-0.16411 ± 0.00006	-
238U $\bar{\nu}$	0.13450 ± 0.00009	-

Table C.20.2: ISCs for the delayed neutron fraction of SNEAK-7A.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)		
	Bretscher	Chiba	Kodeli, [1]
238U (n,n')	-0.06 ± 0.12	-0.1548 ± 0.0017	-0.151
238U (n,f)	0.27 ± 0.04	0.261 ± 0.004	0.276
239Pu (n,f)	-0.21 ± 0.11	-0.224 ± 0.014	-0.252
238U $\bar{\nu}_d$	0.4967 ± 0.0021	0.4683 ± 0.0012	0.488
239Pu $\bar{\nu}_d$	0.4023 ± 0.0008	0.4117 ± 0.0014	0.402
238U $\bar{\nu}_p$	-0.25 ± 0.03	$-0.236308500 \pm 0.000000020$	-0.233
239Pu $\bar{\nu}_p$	-0.66 ± 0.10	-0.66953 ± 0.00003	-0.7
238U $\bar{\nu}$	0.25 ± 0.03	0.232 ± 0.004	0.255
239Pu $\bar{\nu}$	-0.26 ± 0.10	-0.258 ± 0.016	-0.298
238U (n,n)	-0.5 ± 0.3	0.00 ± 0.03	-
57Fe (n,n)	0.06 ± 0.04	0.000 ± 0.004	-
56Fe (n,n)	0.12 ± 0.17	-0.017 ± 0.017	-
238U χ	0.00 ± 0.03	0.000 ± 0.003	-
239Pu (n,n)	-0.14 ± 0.13	-0.006 ± 0.011	-
240Pu (n,n)	0.07 ± 0.04	-0.0006 ± 0.0008	-
240Pu (n,n')	0.014 ± 0.013	-0.0020 ± 0.0005	-
235U $\bar{\nu}_d$	0.05651 ± 0.00019	0.0594 ± 0.0006	-
239Pu χ	0.0 ± 0.1	0.000 ± 0.008	-

Table C.20.3: Reaction contribution to multiplication factor uncertainty of SNEAK-7A. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (72.1%)	
239Pu χ/239Pu χ	0.4055 ± 0.0017
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.36448 ± 0.00013
239Pu (n,f)/239Pu (n,f)	0.31548 ± 0.00021
JENDL-4.0u (67.3%)	
239Pu (n,f)/239Pu (n,f)	0.29512 ± 0.00016
238U (n,γ)/238U (n,γ)	0.27470 ± 0.00012
239Pu χ/239Pu χ	0.2708 ± 0.0010
ENDF/B-VIII.0 (68.7%)	
238U $\bar{\nu}$/238U $\bar{\nu}_p$	0.23237 ± 0.00011
238U (n,γ)/238U (n,γ)	0.22080 ± 0.00008
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.21631 ± 0.00008

Table C.20.4: Reaction contribution to delayed neutron fraction uncertainty of SNEAK-7A. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
238U (n,n)/238U (n,n)	1.2 ± 0.7	-	-
238U (n,n)/238U (n,f)	-1.2 ± 0.4	-	-
57Fe (n,n)/57Fe (n,n)	0.93 ± 0.24	-	-
238U (n,f)/238U (n,f)	0.70 ± 0.11	0.634 ± 0.006	-
56Fe (n,n)/56Fe (n,n)	0.7 ± 0.3	-	-
238U (n,n)/238U (n,n')	0.6 ± 1.5	-	-
238U (n,n')/238U (n,f)	-0.4 ± 0.8	-	-
238U χ/238U χ	0.39 ± 0.25	-	-
239Pu (n,n)/239Pu (n,n)	0.31 ± 0.12	-	-
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.29 ± 0.05	0.296461 ± 0.000012	-
240Pu (n,n)/240Pu (n,n')	0.29 ± 0.17	-	-
238U (n,n')/238U (n,n')	-	1.038 ± 0.006	-
239Pu χ/239Pu χ	-	0.94 ± 0.03	-
JENDL-4.0u			
238U (n,n')/238U (n,n')	1.5 ± 0.9	1.4751 ± 0.0008	1.425
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.1529 ± 0.0006	0.1614 ± 0.0004	0.218
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.668 ± 0.007	1.5729 ± 0.0019	1.61
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.561 ± 0.004	1.6389 ± 0.0016	1.529
238U (n,n)/238U (n,n)	2.4 ± 1.5	-	-
ENDF/B-VIII.0			
238U (n,n)/238U (n,n')	1.3 ± 0.5	-	-
238U (n,n)/238U (n,n)	1.1 ± 0.6	-	-
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.644 ± 0.003	0.6075 ± 0.0007	-
238U (n,n')/238U (n,n')	0.6 ± 0.5	0.449 ± 0.009	-
238U (n,n')/238U (n,f)	-	-0.644 ± 0.004	-
239Pu χ/239Pu χ	-	0.550 ± 0.009	-
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.44 ± 0.04	-0.4147 ± 0.0017	-
238U χ/238U χ	-	0.403 ± 0.004	-
238U (n,f)/238U (n,f)	0.33 ± 0.04	0.3188 ± 0.0025	-
238U $\bar{\nu}$/238U $\bar{\nu}$	0.31 ± 0.04	0.2986 ± 0.0025	-

C.21 SNEAK-7B

Table C.21.1: ISCs for the multiplication factor of SNEAK-7B.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu χ	0.0000 ± 0.0003
238U (n,n')	-0.0173 ± 0.0003
238U (n,γ)	-0.16411 ± 0.00006
238U $\bar{\nu}$	0.13450 ± 0.00009
238U (n,n)	0.1032 ± 0.0009
238U $\bar{\nu}_p$	0.13257 ± 0.00009
238U (n,f)	0.08529 ± 0.00010

Table C.21.2: ISCs for the delayed neutron fraction of SNEAK-7B.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)		
	Bretscher	Chiba	Kodeli, [1]
238U (n,n')	-0.17 ± 0.12	-0.130 ± 0.005	-0.164
238U (n,f)	0.27 ± 0.04	0.251 ± 0.005	0.267
239Pu (n,f)	-0.23 ± 0.08	-0.217 ± 0.007	-0.233
238U $\bar{\nu}_d$	0.5618 ± 0.0012	0.5270 ± 0.0011	0.564
239Pu $\bar{\nu}_d$	0.3002 ± 0.0004	0.3091 ± 0.0010	0.3
238U $\bar{\nu}_p$	-0.36 ± 0.04	-0.320129 ± 0.000006	-0.334
239Pu $\bar{\nu}_p$	-0.55 ± 0.08	-0.5613 ± 0.0003	-0.579
238U $\bar{\nu}$	0.20 ± 0.04	0.207 ± 0.004	0.23
239Pu $\bar{\nu}$	-0.25 ± 0.08	-0.252 ± 0.008	-0.28
56Fe (n,n)	-0.07 ± 0.16	-0.002 ± 0.017	-
239Pu χ	0.00 ± 0.08	0.000 ± 0.007	-
238U χ	0.00 ± 0.03	0.000 ± 0.004	-
238U (n,2n)	-0.019 ± 0.007	-0.002 ± 0.000	-
238U (n,γ)	-0.095 ± 0.021	-0.0114 ± 0.0007	-
235U $\bar{\nu}_d$	0.09964 ± 0.00021	0.1044 ± 0.0007	-
27Al (n,n)	0.02 ± 0.05	-0.001 ± 0.005	-
52Cr (n,n)	0.02 ± 0.08	-0.002 ± 0.004	-

Table C.21.3: Reaction contribution to multiplication factor uncertainty of SNEAK-7B. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (52.4%)	
239Pu χ/239Pu χ	0.5081 ± 0.0016
238U (n,n')/238U (n,n')	0.410 ± 0.003
238U (n,n')/238U (n,f)	-0.3890 ± 0.0012
JENDL-4.0u (82%)	
238U (n,n')/238U (n,n')	0.6033 ± 0.0025
238U (n,γ)/238U (n,γ)	0.38189 ± 0.00013
239Pu χ/239Pu χ	0.3452 ± 0.0009
ENDF/B-VIII.0 (49.2%)	
238U $\bar{\nu}$/238U $\bar{\nu}_p$	0.30833 ± 0.00013
238U (n,γ)/238U (n,γ)	0.30785 ± 0.00009
238U (n,n)/238U (n,n')	-0.294 ± 0.003

Table C.21.4: Reaction contribution to delayed neutron fraction uncertainty of SNEAK-7B. All the reactions showed explain an 85% of the total uncertainty at least. The library used in [1] is JENDL-4.0m

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)		
	Bretscher	Chiba	Kodeli, [1]
JEFF-3.3			
238U (n,n)/238U (n,n')	-1.5 ± 0.8	-	-
238U (n,n')/238U (n,n')	1.5 ± 0.8	0.858 ± 0.021	-
238U (n,n)/238U (n,n)	1.2 ± 0.8	-	-
238U (n,n)/238U (n,f)	1.2 ± 0.4	-	-
238U (n,n')/238U (n,f)	-0.8 ± 0.4	-0.845 ± 0.009	-
238U (n,n')/238U (n,2n)	0.71 ± 0.23	-	-
238U (n,n')/238U (n,γ)	0.68 ± 0.20	-	-
238U (n,f)/238U (n,f)	0.68 ± 0.11	0.609 ± 0.006	-
56Fe (n,n)/56Fe (n,n)	0.7 ± 0.4	-	-
239Pu χ/239Pu χ	-	0.780 ± 0.025	-
238U χ/238U χ	-	0.448 ± 0.013	-
JENDL-4.0u			
238U (n,n')/238U (n,n')	2.4 ± 1.1	1.479 ± 0.003	1.701
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.2890 ± 0.0007	0.3047 ± 0.0006	0.329
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.886 ± 0.004	1.7697 ± 0.0019	1.848
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.2004 ± 0.0017	1.2660 ± 0.0012	1.162
238U (n,n)/238U (n,n)	2.3 ± 1.5	-	-
ENDF/B-VIII.0			
238U (n,n')/238U (n,n')	1.3 ± 0.8	-	-
238U (n,n)/238U (n,n')	-1.2 ± 0.7	0.37 ± 0.04	-
238U (n,n)/238U (n,n) χ	1.0 ± 0.6	-	-
238U (n,n')/238U (n,f)	-0.7 ± 0.3	-0.575 ± 0.008	-
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.7288 ± 0.0016	0.6836 ± 0.0007	-
238U χ/238U χ	0.70 ± 0.11	0.540 ± 0.004	-
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.48 ± 0.05	-0.4577 ± 0.0021	-
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	0.4682 ± 0.0010	0.4904 ± 0.0008	-
27Al (n,n)/27Al (n,n)	0.5 ± 0.3	-	-
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.45 ± 0.04	$0.396288860 \pm 0.000000015$	-
52Cr (n,n)/52Cr (n,n)	0.36 ± 0.17	-	-
239Pu χ/239Pu χ	-	0.518 ± 0.007	-

C.22 MASURCA_R2

Table C.22.1: ISCs for the multiplication factor of MASURCA_R2.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.8884 ± 0.0003
235U $\bar{\nu}_p$	0.8828 ± 0.0003
235U (n,f)	0.5289 ± 0.0003
235U (n,γ)	-0.09421 ± 0.00003
238U (n,γ)	-0.15225 ± 0.00005

Table C.22.2: ISCs for the delayed neutron fraction of MASURCA_R2.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.7500058 ± 0.0010	0.7646934 ± 0.0020
235U $\bar{\nu}_p$	-0.77 ± 0.06	-0.774411 ± 0.000006
238U (n,n')	-0.16 ± 0.06	-0.025 ± 0.004
235U χ	0.00 ± 0.06	0.000 ± 0.005
56Fe (n,n)	-0.09 ± 0.13	0.014 ± 0.023
238U (n,n)	0.14 ± 0.17	0.007 ± 0.022
57Fe (n,n)	-0.03 ± 0.03	0.002 ± 0.003
235U (n,f)	0.00 ± 0.06	-0.033 ± 0.011
238U $\bar{\nu}_p$	-0.220 ± 0.016	$-0.199411900 \pm 0.000000021$

Table C.22.3: Reaction contribution to multiplication factor uncertainty of MASURCA_R2. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (87.6%)	
235U (n,f)/235U (n,f)	1.0841 ± 0.0008
235U (n,γ)/235U (n,γ)	0.71167 ± 0.00018
235U (n,f)/235U (n,γ)	0.6773 ± 0.0004
JENDL-4.0u (66.0%)	
235U (n,f)/235U (n,f)	0.28555 ± 0.00025
238U (n,γ)/238U (n,γ)	0.26321 ± 0.00008
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.26017 ± 0.00007
ENDF/B-VIII.0 (78.2%)	
235U (n,f)/235U (n,f)	0.6094 ± 0.0004
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.56080 ± 0.00015
235U (n,γ)/235U (n,γ)	0.46672 ± 0.00012

Table C.22.4: Reaction contribution to delayed neutron fraction uncertainty of MASURCA_R2. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
238U (n,n')/238U (n,n')	1.1 ± 0.4	-
235U χ/235U χ	0.7 ± 0.4	0.216 ± 0.012
56Fe (n,n)/56Fe (n,n)	0.6 ± 0.3	-
238U (n,n)/238U (n,n')	0.4 ± 0.8	-
57Fe (n,n)/57Fe (n,n)	0.44 ± 0.20	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.41 ± 0.03	0.415557 ± 0.000003
235U (n,f)/235U (n,f)	0.37 ± 0.14	0.231 ± 0.008
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.211 ± 0.016	$0.193774540 \pm 0.000000024$
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.197 ± 0.003	2.2621 ± 0.0016
238U (n,n)/238U (n,n)	1.5 ± 0.8	-
238U (n,n')/238U (n,n')	1.3 ± 0.4	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.519 ± 0.005	3.5881 ± 0.0023

C.23 MASURCA_ZONA2

Table C.23.1: ISCs for the multiplication factor of MASURCA_ZONA2.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
239Pu $\bar{\nu}$	0.7852 ± 0.0003
239Pu $\bar{\nu}_p$	0.7837 ± 0.0003
239Pu (n,f)	0.5518 ± 0.0003
240Pu (n,f)	0.037236 ± 0.000025
239Pu χ	0.0000 ± 0.0003
238U (n,γ)	-0.13807 ± 0.00005
238U $\bar{\nu}$	0.11530 ± 0.00008
238U $\bar{\nu}_p$	0.11362 ± 0.00008

Table C.23.2: ISCs for the delayed neutron fraction of MASURCA_ZONA2.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
238U $\bar{\nu}_d$	0.5640 ± 0.0014	0.4422 ± 0.0011
239Pu $\bar{\nu}_d$	0.3756 ± 0.0005	0.4295 ± 0.0014
56Fe (n,n)	-0.36 ± 0.23	-0.023 ± 0.018
238U $\bar{\nu}_p$	-0.34 ± 0.04	-0.211133 ± 0.000025
238U (n,n)	0.3 ± 0.3	-0.01 ± 0.03
54Fe (n,n)	-0.13 ± 0.07	0.000 ± 0.009
238U (n,f)	0.26 ± 0.03	0.261 ± 0.004
238U (n,n')	0.01 ± 0.11	-0.078 ± 0.007
239Pu χ	0.00 ± 0.10	0.000 ± 0.009
52Cr (n,n)	0.08 ± 0.09	-0.001 ± 0.010
23Na (n,n)	-0.1 ± 0.3	-0.01 ± 0.03
28Si (n,n)	0.26 ± 0.10	-0.002 ± 0.010
238U $\bar{\nu}$	0.24 ± 0.03	0.231 ± 0.004
238U χ	0.00 ± 0.03	0.000 ± 0.003

Table C.23.3: Reaction contribution to multiplication factor uncertainty of MASURCA_ZONA2. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (77.1%)	
239Pu (n,f)/239Pu (n,f)	0.3763 ± 0.0016
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.35897 ± 0.00013
240Pu (n,f)/240Pu (n,f)	0.34593 ± 0.00023
JENDL-4.0u (67.5%)	
239Pu (n,f)/239Pu (n,f)	0.29623 ± 0.00015
239Pu χ/239Pu χ	0.2690 ± 0.0010
238U (n,γ)/238U (n,γ)	0.23429 ± 0.00007
ENDF/B-VIII.0 (69.6%)	
239Pu $\bar{\nu}$/239Pu $\bar{\nu}$	0.21339 ± 0.00007
239Pu $\bar{\nu}_p$/239Pu $\bar{\nu}_p$	0.21298 ± 0.00007
238U $\bar{\nu}$/238U $\bar{\nu}_p$	0.20014 ± 0.00010

Table C.23.4: Reaction contribution to delayed neutron fraction uncertainty of MASURCA_ZONA2. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
56Fe (n,n)/56Fe (n,n)	1.5 ± 0.6	-
238U (n,n)/238U (n,f)	0.9 ± 0.5	-
54Fe (n,n)/54Fe (n,n)	0.8 ± 0.3	-
238U (n,n)/238U (n,n)	0.7 ± 0.7	-
238U (n,f)/238U (n,f)	0.66 ± 0.09	0.641 ± 0.005
238U (n,n')/238U (n,n')	0.6 ± 0.5	-
239Pu χ/239Pu χ	-	0.91 ± 0.03
238U (n,n')/238U (n,f)	-	-0.665 ± 0.010
JENDL-4.0u		
238U (n,n)/238U (n,n)	2.0 ± 1.5	-
238U (n,n')/238U (n,n')	1.8 ± 1.1	0.925 ± 0.006
239Pu $\bar{\nu}_d$/239Pu $\bar{\nu}_d$	1.600 ± 0.004	1.6550 ± 0.0016
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	1.593 ± 0.008	1.4864 ± 0.0017
56Fe (n,n)/56Fe (n,n)	1.5 ± 0.8	-
ENDF/B-VIII.0		
52Cr (n,n)/52Cr (n,n)	1.2 ± 0.6	-
23Na (n,n)/23Na (n,n)	1.2 ± 0.9	-
28Si (n,n)/28Si (n,n)	1.0 ± 0.5	-
238U (n,n')/238U (n,n')	$1. \pm 00.7$	-
238U (n,n)/238U (n,n')	-0.7 ± 0.6	-
238U (n,n)/238U (n,n)	0.6 ± 0.5	-
239Pu χ/239Pu χ	0.63 ± 0.19	0.538 ± 0.009
238U $\bar{\nu}_d$/238U $\bar{\nu}_d$	0.615 ± 0.003	0.5737 ± 0.0007
238U (n,n')/238U (n,f)	-	-0.449 ± 0.010
238U $\bar{\nu}$/238U $\bar{\nu}_p$	-0.42 ± 0.04	-0.3927 ± 0.0015
238U χ/238U χ	-	0.354 ± 0.004
238U (n,f)/238U (n,f)	0.32 ± 0.04	0.3194 ± 0.0023
238U $\bar{\nu}$/238U $\bar{\nu}$	0.30 ± 0.04	0.2958 ± 0.0022
238U $\bar{\nu}_p$/238U $\bar{\nu}_p$	0.29 ± 0.04	$0.26280292 \pm 0.00000006$

C.24 HEU-MET-FAST-062

Table C.24.1: ISCs for the multiplication factor of HEU-MET-FAST-062.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.9185 ± 0.0003
235U $\bar{\nu}_p$	0.9127 ± 0.0003
235U (n,f)	0.5754 ± 0.0003
235U (n,n')	0.03221 ± 0.00022
235U (n,γ)	-0.05259 ± 0.00003
238U (n,n)	0.1288 ± 0.0006
238U (n,n')	0.04981 ± 0.00025

Table C.24.2: ISCs for the delayed neutron fraction of HEU-MET-FAST-062.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.8175 ± 0.0012	0.8387 ± 0.0019
235U $\bar{\nu}_p$	-0.84 ± 0.07	-0.842 ± 0.003
235U χ	0.00 ± 0.06	0.000 ± 0.008
235U (n,f)	-0.08 ± 0.07	-0.056 ± 0.010
235U (n,n')	0.03 ± 0.04	-0.011 ± 0.004

Table C.24.3: Reaction contribution to multiplication factor uncertainty of HEU-MET-FAST-062. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (71.4%)
JEFF-3.3 (%)	
235U (n,f)/235U (n,f)	0.7261 ± 0.0007
235U (n,n')/235U (n,f)	0.5344 ± 0.0018
235U (n,γ)/235U (n,γ)	0.4835 ± 0.0003
JENDL-4.0u (66.2%)	
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.33097 ± 0.00009
238U (n,n)/238U (n,n)	0.3198 ± 0.0018
238U (n,n')/238U (n,n')	0.3100 ± 0.0021
ENDF/B-VIII.0 (76.1%)	
235U (n,f)/235U (n,f)	0.6927 ± 0.0004
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.52714 ± 0.00013
235U $\bar{\nu}$/235U $\bar{\nu}$	0.37376 ± 0.00013

Table C.24.4: Reaction contribution to delayed neutron fraction uncertainty of HEU-MET-FAST-062. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U χ/235U χ	1.3 ± 0.5	0.460 ± 0.009
235U (n,f)/235U (n,f)	0.78 ± 0.14	0.626 ± 0.007
235U (n,n')/235U (n,f)	0.7 ± 0.4	-
235U $\bar{\nu}_p$/235U $\bar{\nu}_p$	0.41 ± 0.03	0.4205 ± 0.0007
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.363 ± 0.004	2.4802 ± 0.0017
235U χ/235U χ	0.7 ± 0.3	-
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	3.842 ± 0.006	3.9417 ± 0.0025

C.25 HEU-MET-FAST-100

Table C.25.1: ISCs for the multiplication factor of HEU-MET-FAST-100.

Quantity	Integrated Sensitivity Coefficients for k_{eff} (%/%)
235U $\bar{\nu}$	0.98181 ± 0.00025
235U $\bar{\nu}_p$	0.97556 ± 0.00025
235U (n,f)	0.6496 ± 0.0003
235U (n,n')	0.08067 ± 0.00017
235U (n,n)	0.1084 ± 0.0003

Table C.25.2: ISCs for the delayed neutron fraction of HEU-MET-FAST-100.

Quantity	Integrated Sensitivity Coefficients for β_{eff} (%/%)	
	Bretscher	Chiba
235U $\bar{\nu}_d$	0.9600 ± 0.0009	0.9676 ± 0.0015
235U $\bar{\nu}_p$	-0.96 ± 0.05	-0.964 ± 0.004
235U χ	0.00 ± 0.05	0.000 ± 0.006
235U (n,f)	-0.04 ± 0.06	-0.054 ± 0.007

Table C.25.3: Reaction contribution to multiplication factor uncertainty of HEU-MET-FAST-100. In brackets, % of the uncertainty explained by the showed reactions.

Quantity	$\Delta k_{eff}/k_{eff}$ (%)
JEFF-3.3 (87.3%)	
235U (n,n')/235U (n,f)	0.6970 ± 0.0009
235U (n,n')/235U (n,n')	0.6911 ± 0.0016
235U (n,f)/235U (n,f)	0.6587 ± 0.0004
JENDL-4.0u (82.7%)	
235U (n,n')/235U (n,n')	0.6472 ± 0.0015
235U (n,n)/235U (n,n)	0.4413 ± 0.0016
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.38096 ± 0.00007
ENDF/B-VIII.0 (83.4%)	
235U (n,f)/235U (n,f)	0.7823 ± 0.0003
235U $\bar{\nu}$/235U $\bar{\nu}_p$	0.56302 ± 0.00010
235U $\bar{\nu}$/235U $\bar{\nu}$	0.39920 ± 0.00010

Table C.25.4: Reaction contribution to delayed neutron fraction uncertainty of HEU-MET-FAST-100. All the reactions showed explain an 85% of the total uncertainty at least.

Quantity	$\Delta\beta_{eff}/\beta_{eff}$ (%)	
	Bretscher	Chiba
JEFF-3.3		
235U χ/235U χ	1.4 ± 0.4	0.882 ± 0.008
235U (n,f)/235U (n,f)	0.94 ± 0.11	0.829 ± 0.005
JENDL-4.0u		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	2.6443 ± 0.0025	2.7271 ± 0.0013
ENDF/B-VIII.0		
235U $\bar{\nu}_d$/235U $\bar{\nu}_d$	4.512 ± 0.004	4.5477 ± 0.0021

References

[1] I. Kodeli. "Sensitivity and uncertainty in the effective delayed neutron fraction (β_{eff})". In: *Nuclear Instruments and Methods in Physics Research A* 715 (2013), pp. 70–78.