IV.E.6.a. Modifying the parameter uncertainties

In response to analysts' requests for automated methods to increase the uncertainties on the resonance parameters, a variety of options have been created. With the exception of Option #2 below, these will be used with runs that perform post-processing operations (e.g., calculate multigroup averages as described in Section V.C, or create ENDF File 32 descriptions of the PCM as discussed in Section IX). All of these methods assume that uncertainties are to be modified but the correlation coefficients will remain the same.

Option #1. A simple INPut file command will cause every uncertainty for every resonance parameter to be multiplied by the same value, that is, every element of the PCM to be multiplied by the square of that value. This command is

```
INITIAL UNCERTAINTY multiplier = value
```

The equal sign must be present, and "value" is replaced by a positive real number. At the beginning of this SAMMY run, each element of the PCM obtained from the input COVariance file is multiplied by the square of the value. See test case tr019, run d.

Option #2. A related command is

```
FINAL UNCERTAINTY MUltiplier = value
```

Here it is the output PCM that is modified; see test case tr019, run e, for an example of the use of this command. Use of this option is not recommended because it requires the analyst to decide before viewing the PCM that the PCM must be changed. Option #1 can be used to produce the same result without permanently changing the SAMMY.COV file (produced directly from the data analysis process) via multiplication by a preconceived value.

Option #3. To multiply the PCM by a value which varies with energy, and may also be spin group dependent, use the command

```
E-DEPENDENT INITIAL uncertainty multiplier    or
E-DEPENDENT UNCERTAInty multiplier.
```

(The hyphen is optional here.) A separate EDU (energy-dependent uncertainty) file is needed with this command; the EDU file contains the following information:

1. Alphanumeric title
2. Second title line, or blank
3. Spin group = 1 [only the equal sign and the number are absolutely necessary]
4. Energy, value of multiplier in 2F10.1 format (i.e., one value in the first ten columns and the second in the next ten columns)
5. Repeat line 4 as many times as needed
6. End with a blank line
7. Repeat lines 3 through 6 as many times as needed

Energies (line 4) must be in order of increasing energy. For resonances in the specified spin group, SAMMY will linearly interpolate to give the value of the multiplier at the resonance

energy. If the resonance energy is outside the specified energies (below the first or above the last), the multiplier is assumed to be unity. Likewise, if a spin group is omitted from this listing, the multiplier will be unity for all resonances in that group. Note that the same multiplier is used for all parameters (energy and widths) for a particular resonance.

The name of the EDU file is given after the name of the COVariance file in the input stream. Note that this option works only if you are using a pre-existing COVariance file, not if starting from scratch. Examples are given in test case tr019, runs f and g.

Option #4. To modify the uncertainty on each parameter separately and independently from the modification of the uncertainties on other parameters (while maintaining the original correlation coefficients), insert the commands

```
P COVARIANCE MATRIX is correct, u is not
MODIFY P COVARIANCE matrix before using
```

into the INPut file. Create a file containing the new values for the uncertainties, in the same order in which they appear in the LPT file, in free format. For those parameters for which you do not wish to change the uncertainty, it is not necessary to copy the value of the uncertainty into this file; instead, the value in this file can be set to zero. The name of this file is given to SAMMY directly following the name of the COVariance file. For examples, see test case tr149, runs l, m, o, and p.

Option #5. The RSAP program [RS03] contains options to read the SAMMY-produced SAMMY.PUB file (see Section VII.F) and create plots showing the effects of modifying the parameter values within the bounds of the uncertainties on the parameters. The uncertainties can be scaled, in which case RSAP produces a new file rsap.PUB in the same format as SAMMY.PUT, containing, however, the scaled uncertainties.

To report the scaled uncertainties back to SAMMY for additional computations, an auxiliary code PUB2COV was written by D. Wiarda. (This code will be made available as part of the RADCOP program under development by R. O. Sayer. [RS06a]) Input to the PUB2COV code consists of the original SAMMY PARameter and COVariance files, the original PUB file, and the modified PUB file. Output is a hybrid SAMMY COVariance file containing the original parameter values, the modified *p*-PCM and the original *u*-PCM. (The modified *p*-PCM has the new uncertainties but the original correlation coefficients.)

To use the hybrid SAMMY COVariance file in a new SAMMY run (e.g., to generate ENDF Files 2 and 32), include the command

```
P COVARIANCE MATRIX is correct, u is not
```

in the INPut file.