X.Q. SAMRML: CALCULATE CROSS SECTIONS FROM ENDF FILE 2

The program SAMRML was created as an aid for persons wishing to implement the ENDF File 2 LRF=7 (R-Matrix Limited) Format. SAMRML can be used in at least two ways: This coding may be inserted directly into a processor code (after appropriate re-writes). When independent coding is developed, SAMRML can be used to test the results.

The stand-alone code SAMRML was derived from the cross-section-calculation portion of SAMMY, with the following changes: Experiment-related pieces were removed from this code; only one nuclide is considered at a time, and no corrections are made for any measurement-related effects. All cross section types are generated in a single SAMRML run.

SAMRML calculates energy-differential (angle-integrated) elastic, absorption, and reaction cross sections. If requested, SAMRML will also calculate elastic angular distributions. In addition, an option exists for generating partial derivatives of the angle-integrated cross sections with respect to the resonance parameters.

The code will calculate one of two versions of the partial derivatives: In the default mode, derivatives are with respect to the resonance widths $\Gamma_{\lambda x}$ and energies E_λ, as they appear in the ENDF files. Alternatively, the derivatives can be given with respect to SAMMY's *u*-parameters as defined in Section II of this report; this option is useful for ensuring that SAMRML is indeed working properly. The default option is currently the more useful one for processor codes that make more direct use of the ENDF files than does SAMMY.

Two input files are needed for SAMRML. The first contains a list of energies (one per line, ending with a blank line) and angles (one per line, ending with a blank line) at which the calculation is to be performed. If no angles are given, no angular distributions will be calculated.

The second file is an ENDF file in which File 2 uses LRF=1 (single-level Breit Wigner), 2 (multilevel Breit Wigner), 3 (the so-called Reich-Moore format), or 7 (the R-matrix limited format).

Four lines of input are needed following the "samrml" run command:

1. name of energy/angle file
2. name of ENDF File 2 file
3. the ENDF material number (MATNUM); if MATNUM is zero, only the File 2 portion of the ENDF file is to be included in the file specified in the previous line.
4. two characters, in the first two columns of this line. If the first character is "y" or "Y" (for "yes"), then partial derivatives will be generated. If the second character is "s" or "S", then those derivatives will be with respect to the SAMMY *u*-parameters.