V.F. SUMMED STRENGTH FUNCTION

The summed strength function, as defined by Mughabghab [SM06] for incident neutrons and converted to SAMMY notation, is

$$S\ (\Lambda) = \frac{g_c}{(2l+1)\Delta E_\Lambda} \sum_{\lambda=1}^{\Lambda} \sqrt{\frac{1}{E_\lambda}}\, \frac{\rho}{P_l(\rho)}\, \Gamma_{\lambda n}$$
$$= \frac{2g_c}{(2l+1)\Delta E_\Lambda} \sum_{\lambda=1}^{\Lambda} \frac{\rho}{\sqrt{E_\lambda}}\, \gamma_{\lambda n}^2 \quad . \qquad \text{(V F.1)}$$

Only the first elastic (neutron) channel $c = n$ is considered here. The summation is over all resonances of the one or two particular spin groups (where Λ is the total number of such resonances) in an energy interval ΔE_Λ. The convention for ΔE_Λ, taken from [HD02], is that ΔE is the energy difference between the first and last resonances, plus one average spacing between resonances, that is,

$$\Delta E_\Lambda = (E_\Lambda - E_1) + \frac{1}{\Lambda - 1}(E_\Lambda - E_1) = \frac{\Lambda}{\Lambda - 1}(E_\Lambda - E_1) \quad . \qquad \text{(V F.2)}$$

To calculate $S(1)$ through $S(N)$, for resonances within a specified energy range in one or two spin groups (for which the first elastic channels must have the same value of *l*), include the following command in card set 3 of the INPut file:

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SUMMED STRENGTH FUNCtion is wanted
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In the interactive input, immediately following the name of the PARameter file, give the name of the COVariance file. On the next line, give two spin group numbers (the second of which can be zero if only one is required) and the energy range (minimum and maximum energies) for which you want the summed strength function to be calculated, in free format. Subsequent lines may contain the same information for other combinations of spin groups and energy ranges, if desired. See test case tr019, run h, for examples.

[There are two differences here from the usual SAMMY input: (1) No DATa file is needed, and no dummy name should be supplied. (2) This option works ONLY when a previous SAMMY run has generated a SAMMY.COV file.]

For each input line, SAMMY will calculate $S(\Lambda)$ for Λ=1 to N, where N is the total number of resonances in the energy interval specified. SAMMY will also calculate the uncertainties for each $S(\Lambda)$, and the covariance matrix for the set of $S(\Lambda)$. See test case tr019, run h.