

DF Davydov-Filippov Code manual.

15 May, 2008

DF code is design to calculate energies of collective states (up to spin 30) and reduced matrix elements of E2 transitions in the even-even nuclei. Calculations based of Davidov-Filippov model of rigid asymmetric rotor [1] can be performer with the E2 operator $M_{E2}(\beta, \cos(\gamma))$ or $M_{E2}(\beta, \cos(\gamma), \beta^2, \cos(2\gamma))$. An input file for the FAUST code can be created as an option.

Start of execution.

To run the code the command:

C>df

should be executed in a DOS window. All input parameters are shown in the window. Lowest line of the screen is reserved for user to enter the data.

First the parameters filename is requested:

Input parameters filename:

The file is optionally created by DF code to store the current set of input parameters to save time during the next execution of the code. If the parameter file is has been already created it is enough to type its name (without extension!). To skip this action – press ENTER.

Input Data

If no parameter file was read, it will be requested:

1. enter z :
2. enter a :
3. enter β :
4. enter γ [deg] :
5. enter energy of 2(1) [keV]:

z and a are atomic and mass number of given nuclei, β and γ -are deformation parameter. In a point **5.** energy of the first 2^+ state in keV is needed.

6. β^2 included [Y/N]?

Y means that the E2 operator with β^2 and $\cos(2\gamma)$ terms will be used to calculate reduced matrix elements. The choice **N** is presented as:

6. β^2 not included.

7. energies & vectors on output [Y/N]?

The code can print energies and K distribution of each state wave function (option **Y**). To make the output more compact and clear only energies can be printed (option **N**):

7. energies only.

8. input file for FAUST [Y/N]?

With option **Y** the code will create the FAUST input file (marked with **8. input file for FAUST**). The file will have the extension **.DAT**.

The spin dependence parameter of moment of inertia (see [2]) is requested:

9. Parameter of variable moment of inertia

The list of calculated states can be defined:

0. enter spin:

For the given spin numbers of the states can be introduced (separated by colons)

enter state numbers:

ENTER without data means that no state of given spin will be taken into calculation.

Spin parameter -1 allows to mark all states up to given spin:

up to spin:

ENTER without spin finishes states defining.

Input Data correction

To correct or change input data (also parameters read from the parameter file):

all correct [Y/N] ?

Answer **N** causes the request:

enter parameter to change (1-0,CR-exit):

ENTER will finish the data input.

Outputs are written into disk files. Filenames can be given on the request:

output filename:

Filename should be given without extensions. In this case:

xxxxxxx.OUT – output,

xxxxxxx.DAT – FAUST input,

xxxxxxx.MAP – parameter file (created optionally):

save input parameter [Y/N]?

References

- [1] A.S. Davydov and G.F. Filippov, Nucl. Phys. 8 (1958) 237.
- [2] M. A. J. Mariscotti, G. Scharff-Goldhaber, and B. Buck, Phys.Rev. 178, 1864 (1969).