

Function to be plotted:

$$E = A_- \left[-2\sqrt{rt(2I-r)(2S-t)} + \frac{I-1}{2S}t + \frac{S-1}{2I}r + \frac{rt}{4IS} \right]. \quad (1)$$

Variables: r and t

angular momenta: I and S

what do we need:

The minima points (r,t) of the function E/A_- for several pairs (I,S):

(I,S) = (I,1) with I=1,2,3,...,10

(I,S) = (1,S) with S=1,2,3,...,10

Contour plots of E/A_- for 4 pairs (I,S): (1,1), (1,10), (10,1), (8,8)

De adaugat:

Derivatele de ordinul 1:

$$\begin{aligned} \frac{\partial E}{\partial r} &= A_- \left[-2\sqrt{\frac{t(2S-t)}{r(2I-r)}}(I-r) + \frac{S}{2I} - \frac{1}{4IS}(2S-t) \right], \\ \frac{\partial E}{\partial t} &= A_- \left[-2\sqrt{\frac{r(2I-r)}{t(2S-t)}}(S-t) + \frac{I}{2S} - \frac{1}{4IS}(2I-r) \right]. \end{aligned} \quad (2)$$

Hessianul:

$$\begin{aligned} \frac{\partial^2 E}{\partial r^2} &= 2A_- I^2 \frac{\sqrt{t(2S-t)}}{(r(2I-r))^{3/2}}, \\ \frac{\partial^2 E}{\partial r \partial t} &= A_- \left[\frac{1}{4IS} - 2 \frac{(I-r)(S-t)}{\sqrt{rt(2I-r)(2S-t)}} \right], \\ \frac{\partial^2 E}{\partial t^2} &= 2A_- S^2 \frac{\sqrt{r(2I-r)}}{(t(2S-t))^{3/2}}, \\ \frac{\partial^2 E}{\partial t \partial r} &= \frac{\partial^2 E}{\partial r \partial t}. \end{aligned} \quad (3)$$

Conditia de minim: Derivatele de ordinul 1 sa fie nule si Hessianul sa fie pozitiv.

Good luck!