Lets assume that the radius changes, in a sense a distortion of space, it would seem that the diffusive parameter should change also, having same dimension

$$r_m = r_o(1+\Delta r)$$

$$a_m = a_o(1+\Delta r)$$

How should depths change - Keep the strength the same - Volume Integrals.

Assume $V_o \to V_M$ (real)

$W_o \to W_m$ (imag)

1 $$\int V_o f(\underset{\uparrow}{r_o, a_o}) r^2 dr = \int V_m f(r_m, a_m) r_m^2 dr_m$$

Woods-Saxon

so $$V_m = V_o \frac{\int f(r_o, a_o) r^2 dr}{\int f(r_m, a_m) r_m^2 dr_m}$$

but ultimately I found this definition unsatisfactory the space does not change - the space it is integrated

2 $$\int V_o f(r_o, a_o) r^2 dr = \int V_m f(r_m, a_m) \underset{\uparrow}{r^2} \, d\underset{\uparrow}{r}$$

not modified. Note change

Note $r_m = r\,\Delta r$

so $dr_m = \Delta r\, dr$ $\qquad r_m^2 = r^2 \Delta r^2$

We solve integral $\int f(r_m, a_m)\, r_m^2\, dr_m$

but we want $\int f(r_m, a_m)\, r^2 dr$

$$\text{So } \int f(r_m, a_m) r^2 dr = \int f(r_m, a_m)\, r_m^2\, dr_m \left(\frac{r^2}{r_m^2}\,\frac{dr}{dr_m}\right)$$

$$= \frac{\int f(r_m, a_m)\, r_m^2\, dr_m}{\Delta r^3}$$

2 $\int V_o f(r_o, a_o)\, r^2 dr = \int V_m f(r_m, a_m)\, r_m^2\, dr_m \Big/ \Delta r^3$

$$\text{so } V_m = V_o \frac{\int f(r_o, a_o)\, r^2 dr\ \Delta r^3}{\int f(r_m, a_m)\, r_m^2\, dr_m}$$

Note that in the code, right now we DIVIDE by Δr^3 → July 2020. Wrong?