Global Scaling Analysis – how does it function?

Here is a brief description of the step by step procedure:

1. Make sure that the measured quantity X is statistically significant.
2. Define X_{min} = X – dx and X_{max} = X + dx, where dx is the uncertainty of X.
3. Calculate the natural logarithms of the ratios: ln (X_{max}/Y) and ln (X_{min}/Y), where Y is the corresponding proton or electron unit of measurement. Thanks to the high precision of Y, mostly you can ignore its uncertainty.
4. Express the logarithms as simple continued fractions [n_0; n_1, n_2, ... n_k].
5. Truncate the continued fractions after the last denominator they have in common.

The length of the truncated continued fraction and the values of the denominators indicate the stability level of the analyzed process or structure. Integer logarithms [n_0] indicate the highest possible stability level.

The divisibility of the denominators of the truncated continued fraction show the interscalar connectivity of the analyzed process or structure.

Let us take as example the orbital velocity of Jupiter. This velocity varies between 12.44 and 13.72 km/s. The unit of measurement is the speed of light in a vacuum c = 299792458 m/s. In this case, the uncertainty of Y is zero per definition. Now we can calculate the logarithms and the continued fractions (in square brackets):

$$\ln (13720 / 299792458) = -9.99199... = [-10; 125]$$

$$\ln (12440 / 299792458) = -10.0899... = [-10; -11]$$

The truncated continued fraction is [-10]. As being integer, this logarithm indicates that the orbital velocity of Jupiter is of the highest possible level of stability.

Another example - the orbital distance of Jupiter is between 4.9501 AU (Perihelion) and 5.4588 AU (Aphelion), where 1 AU = $1.495978707 \cdot 10^{11}$ m. We take the Compton wavelength $\lambda_{electron}$ = $3.8615926764 \cdot 10^{-13}$ m of the electron as unit of measurement and receive:

$$\ln (5.4588 \cdot 1.495978707 \cdot 10^{11} \text{ m} / 3.8615926764 \cdot 10^{-13} \text{ m}) = 56.01097... = [56; 91]$$

$$\ln (4.9501 \cdot 1.495978707 \cdot 10^{11} \text{ m} / 3.8615926764 \cdot 10^{-13} \text{ m}) = 55.91315... = [56; -12]$$

The truncated continued fraction is [56]. As being integer, this logarithm indicates that also the orbital distance of Jupiter is of the highest possible level of stability.

For comparison we analyze the radius of the Earth that is between 6353 and 6384 km:

$$\ln (6.384 \cdot 10^{3} \text{ m} / 3.8615926764 \cdot 10^{-13} \text{ m}) = 44.25183... = [44; 4, -34]$$

$$\ln (6.353 \cdot 10^{3} \text{ m} / 3.8615926764 \cdot 10^{-13} \text{ m}) = 44.24696... = [44; 4, 20]$$

The truncated continued fraction is [44; 4]. As being rational, this logarithm indicates that the radius of the Earth is not of the highest possible level of stability, but it corresponds with an equipotential surface of the Fundamental Field. More information on this topic you find in Hartmut Müller's book on the pages 28 – 32 and 50 – 53.

The proton and electron units of measurement called Fundamental Metrology you find in table 1 on page 20 of the book.

In natural sciences, the analysis of the measurements is only the first part of research. The most complex part is the interpretation of the results.

How to interpret correctly the result of a Global Scaling Analysis?

Hartmut Müller's book gives you the basic ideas. However, you can learn more, if you share your results with the Interscalar group in Facebook.