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My dear professor Wiener.

You will remember that some time ago we discussed the relative merits of the periodogram analysis and that of other methods as means of detecting hidden periodicities. I should like to get to the bottom of this and convince myself whether I am right or wrong in believing that there are other methods which in practice in many cases will be more powerful than the periodogram analysis method. For this purpose I should like to test the various methods on some constructed examples and therefore need an authoritative description of your computation technique. I shall be very thankful therefore if you will describe step by step the calculations to be performed if you were to solve by your periodogram technique the following problem:

Given observations of a time series w_t over a finite time range. For simplicity assume equidistant observations, which will most frequently be the case. It is given that the series is of the form:

$$w_t = x_t + y_t \dots + z_t + e_t$$

where x , y , \dots , z are a finite and relatively small number (say between 1 and 5) of exact sine terms with unknown frequencies, phases and amplitudes, and e_t an auto - non - correlated series,

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$\sum_t e_t e_{t+s}$ is also zero if $s \neq 0$.

From the knowledge of the series w_t it is wanted to determine the frequencies of the sine terms x, y, \dots, z .

I know, of course, the usual text book descriptions of the use of the periodogram for solving this problem, but there may be more or less important differences of detail, I should therefore be very thankful for having your own exact description of your technique. No proofs are needed, just give it in a "recipe" form.

I shall, of course, be glad to communicate to you whatever results we obtain from the proposed comparison of your and our methods.

With best personal regards

Cordially yours

Ragnar Frisch. +