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REPORT FOURIER-SUM
(Program F43)
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FOURIER-SUM (Program F43)

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FOURIER-SUM is a FORTRAN computer program written for the IBM-704 whose particulars were originally set forth in a memorandum from Dr. George Parzen to Mr. M. Storm on August 19, 1960. This program is designed to compute the sum of a Fourier series expressed as:

$$DHZ = C_0 + \sum_{n=1}^{N_{MAX}} C_n \cos\left[Nn(\Theta-\bar{\Theta}) - \beta_n\right] \quad ,$$

where the coefficients

$$C_0, \; C_1, \; C_2, \; \ldots, \; C_n, \; \ldots, \; C_{N \, max}$$

and

$$\beta_1, \beta_2, \ldots, \beta_n, \ldots, \beta_{N_{MAX}}$$

and the quantities N, $\bar{\Theta}$ are given as input via data cards. The format of these cards is dependent upon the MU RCD2 reading sub-routine and is described fully in that subroutine's report (MURA-536).

The summation is carried out for any number of values of Θ ranging from Θ_i to Θ_f in steps of ½ degree. Any other step-size is also possible by changing the value of a parameter Z. In radian measure the actual increment for Θ within the computer is given as $\pi Z/360$. Again, the parameters Θ_i, Θ_f and Z are entered as input via cards.

Prior to actual reading of the data cards, the entire storage block for all input parameters is cleared. There are two exceptions, namely, N and Z which are preset to the value 1 when not entered on the agendum form. Consequently, other quantities which are not used or have the value zero can be omitted from the agenda.

Initial printing of input data is provided and appropriately labeled and therefore should be self-explanatory. The printing of the summation results occurs at every interval of $\pi z/360$. Again, the two columns are appropriately identified with the added comment that the symbol and number on the left as THD is the value of Θ expressed in degrees.

Listed below are some general comments concerning operational specifications of this program

1. Upon reaching the value of Θ_f, the program returns to the data reading subroutine. Hence processing of stacked runs is possible. The absence of more cards will produce a stop.

2. A maximum of 500 storage cells has been reserved for each array of C_n coefficients and the beta terms. Exceeding these limits may result in an incorrect run.

3. No sense switches are used by the program.

4. The printer requires either the SHARE #1 or MURA #2 printer board.

The necessary input parameters and their relative storage addresses are:

ADDRESS	PARAMETER	REMARKS
1	ID	Human identification no.
2	N_{max}	upper limit in summation
3	Θ_i	initial Θ in degrees
4	Θ_f	final Θ in degrees
5	$\bar{O}$	expressed in degrees
6	N	referred to as BIG N
7	Z	scale factor for Θ increment

ADDRESS	PARAMETER	REMARKS
10	C_0	constant term
11	C_1	
12	C_2	
$\vdots$	$\vdots$	
etc		
511	β_1	
512	β_2	
$\vdots$	$\vdots$	
etc.		

All data should be written on a standard MURA/FORTRAN agendum form which is available. In preparing a group of runs only values which change from previously entered data need be specified.