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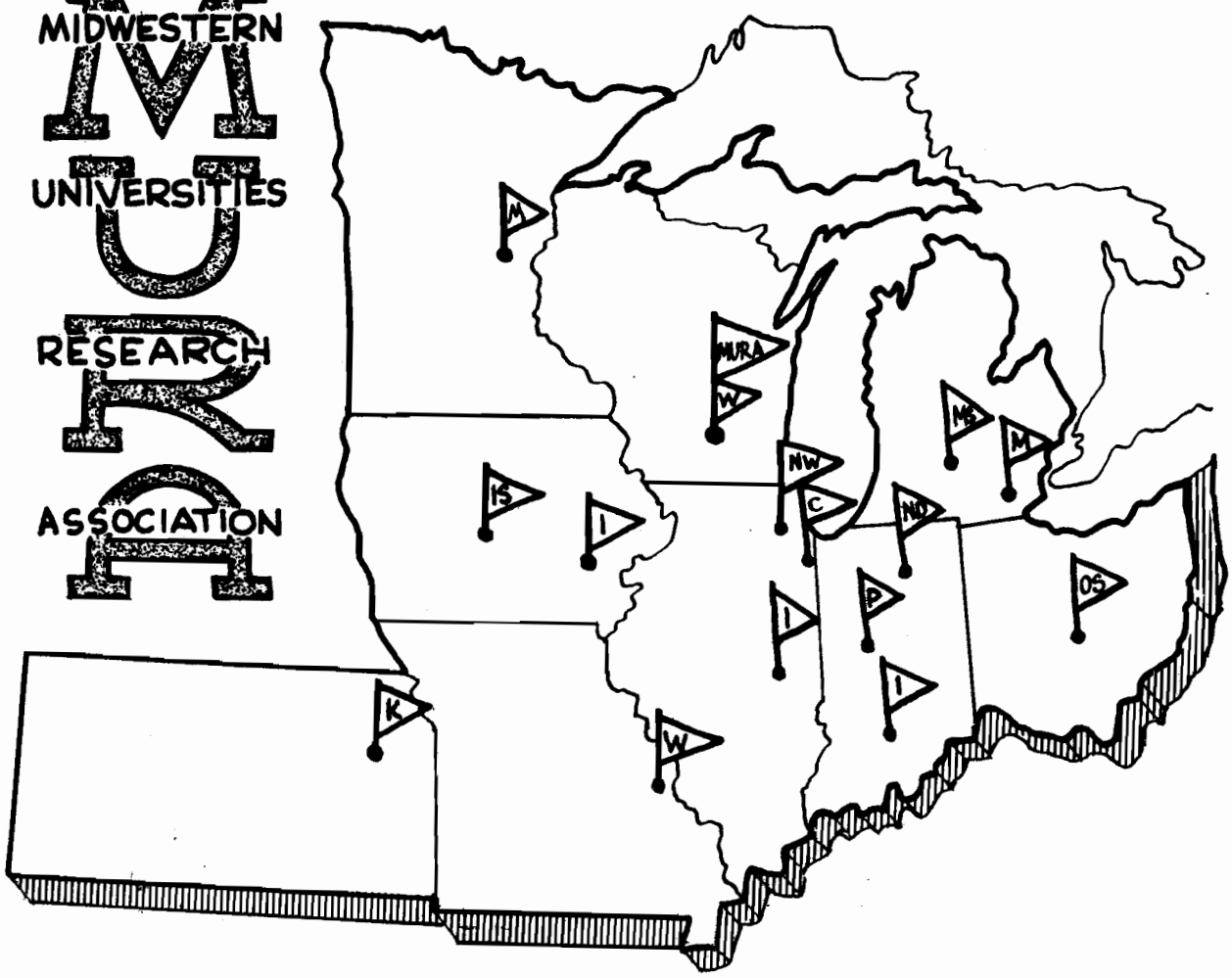

REPORT FORMESH WITH STUMBLEBUMPS
(Program 138)
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FORMESH WITH STUMBLEBUMPS (Program 138)

J. N. Snyder

This program arose because of a verbal memorandum and other exchanges between D. W. Kerst, A. Sessler, and J. N. Snyder, 30 June 1957.

The program bears sufficient similarity to FORMESH WITH GRUMBLEBUMPS (Program 62) that the discussion can be carried out in terms of this program. Whenever a bump is applied the analytic form of the bump will be identical to that given in Program 62 except that the arguments of the trigonometric functions will be:

$$\alpha_1 x$$
$$\alpha_2 x$$

instead of

$$m_1 N\theta$$
$$m_2 N\theta$$

, respectively.

This program again bears sufficient similarity to FORMESH WITH GRUMBLEBUMPS that it is felt that the construction of a new AGENDUM SHEET is not warranted. Therefore this program should be invoked by taking a FORMESH GRUMBLEBUMPS (PROGRAM 62) AGENDUM SHEET and making the following modifications:

Cross out FORMESH GRUMBLEBUMPS, PROGRAM 62 and write in its place FORMESH STUMBLEBUMPS, PROGRAM 138.

Cross out m_1 and m_2 at addresses 7343 and 7344, respectively, and write in their place the quantities

$$\frac{\alpha_1}{2\pi} 2^{-10}$$

$$\frac{\alpha_2}{2\pi} 2^{-10}$$

, respectively.

These two quantities must also go among the FRACTIONS instead of among the INTEGERS. This can be indicated by encircling them in a balloon with an arrow pointing down to the FRACTIONS.

There can be no xy, x^3, x^2y, or xy^2 terms in the Δh_i, that is, λ_5, λ_6, λ_8 and λ_9 <u>must be zero.</u>

The bump will not be applied if, and only if

$$|y| < |y_M|$$

where y_M is a parameter entered by the user in address 7210 in place of $C_{\theta 5}$ on the GRUMBLEBUMPS AGENDUM SHEET.

It goes without saying that the quantities

$$\frac{\alpha_1}{2\pi} 2^{-10} \quad \text{and} \quad \frac{\alpha_2}{2\pi} 2^{-10}$$

must be fractions less than 1 in magnitude. It should further be noted that the arguments of the trigonometric functions are:

$$\alpha_1 x \text{ and } \alpha_2 x$$

even though the input data involves the factor 2π in the denominator. In all other respects the FORMESH GRUMBLEBUMPS procedure should be followed. The limitations on mesh size for this program are the same as for the aforementioned and oft-quoted FORMESH GRUMBLEBUMPS program.

This new program, FORMESH WITH STUMBLEBUMPS, is also provided with an INVARIANTS version. Either of these programs will be identified by the printing of a program identification number of 138 in a fashion similar to all other programs of the FORMESH family.

FIRST

AUGMENTATION OF

FORMESH WITH STUMBLEBUMPS

It is now necessary that the linear terms in x also be removed from the expression for Δh_i, that is, λ_1 must be zero. The coefficients of the quadratic and cubic terms in y are now to be multiplied by 2^{-11} before being entered on the Agendum Sheet. The linear terms in y and the constant term in Δh_i are unaffected.

SECOND

AUGMENTATION OF

FORMESH WITH STUMBLEBUMPS

It has now presumably become necessary to change the scaling in the expressions for Δh_i. The coefficients of the quadratic and cubic terms in y are now to be multiplied by 2^{-18} before being entered on the Agendum Sheet. The coefficient of the linear term in y is to be multiplied by 2^{-9} before being entered on the Agendum Sheet. The constant term is unaffected and unscaled.

THIRD AND FINAL AUGMENTATION OF,

AND COMMENT PERTAINING TO,

FORMESH WITH STUMBLEBUMPS (PROGRAMME 138)

It is now possible to deceive this program into providing arbitrary scaling of the input data. Let us define an integer

$$x = 8\ 371\ 830\ 784$$

The terms involving constants in the expressions for the bump cannot be scaled. Let it be assumed that the linear term in y and the input data pertaining thereto is scaled by the factor 2^{-p} and that the quadratic and cubic terms in y and the input data pertaining thereto are scaled by the factor 2^{-q}. In the FORMESH STUMBLEBUMPS program this is achieved by placing the integer x + p in location 7109 and the integer x + q in location 7438 among the other integer data.

In the FORMESH STUMBLEBUMPS INVARIANTS program this is achieved by placing the integer x + p in location 7109 and the integer x + q in location 7104 among the other integer data.

In either of these programs the values 9 and 18 will be used for p and q, respectively, if no such extra cards are inserted.