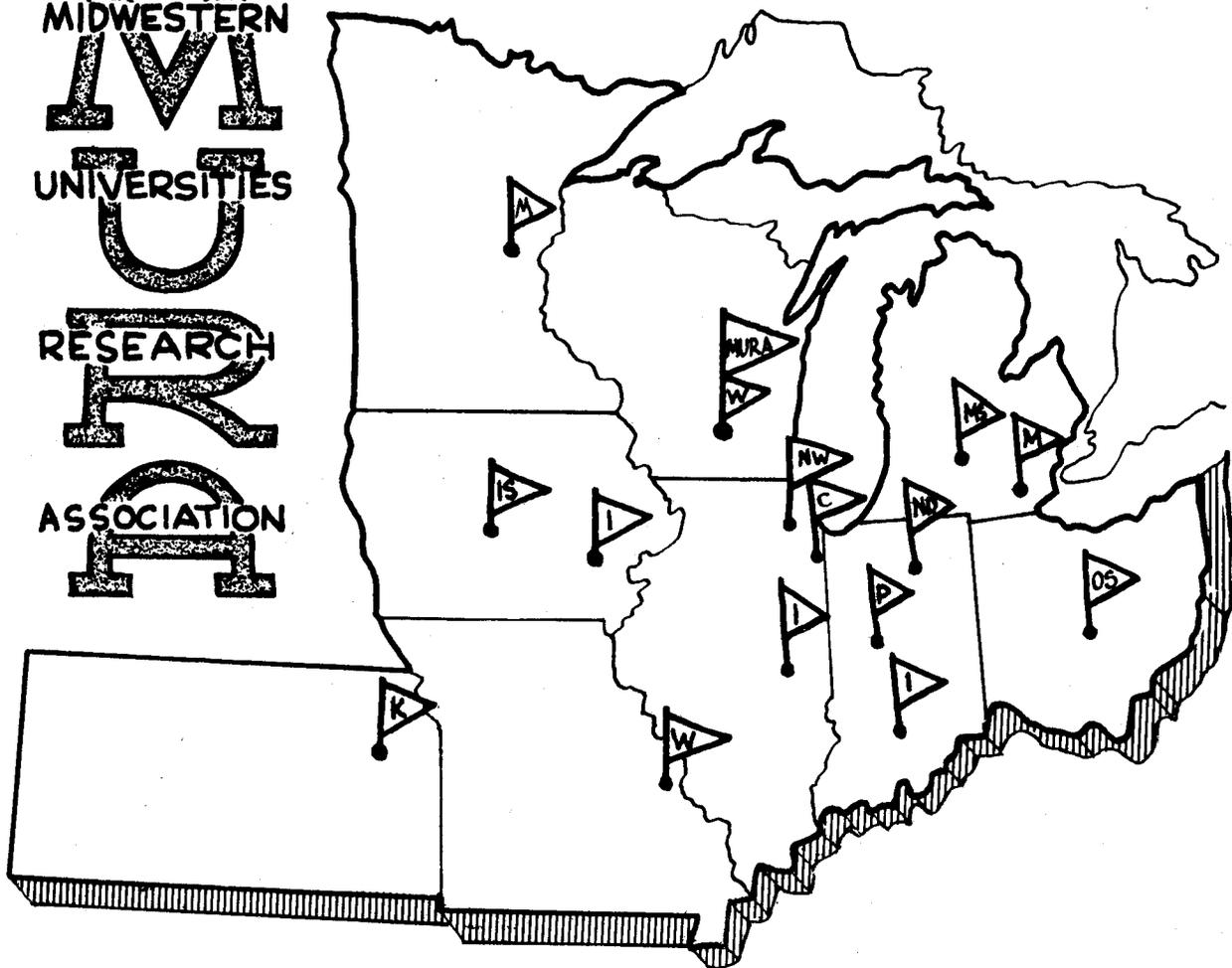




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REPORT

FORMESH FUMBLEBUMPS
(Program 60)
February-March, 1957

NUMBER

234

Internal
(IBM Program)

FORMESH FUMBLEBUMPS
PROGRAM 60

J. N. Snyder

This program was inspired by the memoranda L. Jackson Laslett to J. N. Snyder 28 December 1956 and A. M. Sessler to J. N. Snyder 22 March 1956.

Consider a transformation B of the form

$$\begin{aligned}x &\rightarrow \Delta x + \alpha_x x + \beta_x p_x + E(\rho, \Psi) \\p_x &\rightarrow \Delta p_x + \gamma_x x + \delta_x p_x + F(\rho, \Psi) \\y &\rightarrow \Delta y + \alpha_y y + \beta_y p_y + G(\rho, \Psi) \\p_y &\rightarrow \Delta p_y + \gamma_y y + \delta_y p_y + H(\rho, \Psi)\end{aligned}$$

where

$$\rho = r_x x + s_x p_x$$

and

$$\Psi = r_y y + s_y p_y$$

$$E(\rho, \Psi) = e_1 \rho^2 + e_2 \Psi^2 + e_3 \rho \Psi + e_4 \rho^3 + e_5 \Psi^3 + e_6 \rho^2 \Psi + e_7 \rho \Psi^2$$

$$F(\rho, \Psi) = f_1 \rho^2 + f_2 \Psi^2 + f_3 \rho \Psi + f_4 \rho^3 + f_5 \Psi^3 + f_6 \rho^2 \Psi + f_7 \rho \Psi^2$$

$$G(\rho, \Psi) = g_1 \rho^2 + g_2 \Psi^2 + g_3 \rho \Psi + g_4 \rho^3 + g_5 \Psi^3 + g_6 \rho^2 \Psi + g_7 \rho \Psi^2$$

$$H(\rho, \Psi) = h_1 \rho^2 + h_2 \Psi^2 + h_3 \rho \Psi + h_4 \rho^3 + h_5 \Psi^3 + h_6 \rho^2 \Psi + h_7 \rho \Psi^2$$

Consider also a second transformation B' identical in form except the different coefficients are denoted with primes.

The machine is regarded as having a periodicity of N_B integration steps. A counter C_B which can be given an initial setting $(C_B)_0$ counts up to N_B , is reset to zero, etc. as the integration proceeds. After the first step on which

$$C_B > n + ax + by \geq 1$$

the transformation B is applied to the coordinates and momenta. After the first step on which

$$C_B > n' + a'x + b'y < N_B, \quad n' < N_B - 1$$

the transformation B' is applied. The transformations are applied before printing if printing be called for on the step in question.

The above 95 data items can all be entered on the data sheet. Items not entered will be regarded to be zero. Such quantities should not be entered. All quantities except $N_B, n, n', a, a', b, b',$ and $(C_B)_0$ must be less than 1, and are in the unscaled units of x, y and p_x, p_y . All quantities once set are held from run to run except that $(C_B)_0$ if set different from zero must be reset on each run.

The mesh size must be limited by

$$3ab \leq 7190$$

Invariants may also be calculated, in which case the limit is $3 ab \leq 7097$.
Larger meshes can be inserted but the b_{PHONY} procedure should be executed
so as to satisfy the above limits.

The printing format is identical to FORMESH except that the program
number 60 60 60 60 60 will appear.

If sense switch 4 be moved up the transformations will no longer be applied
until it be moved down again. However, phase will not be lost in this process.

FORMESH FUMBLEBUMPS
PROGRAM 60
AGENDUM SHEET

(To be attached by staples to the front of a series of FORMESH runs.)

Sense Switch 4 must be down; otherwise bumps are omitted even if overwrite be present.

ARE FORMESH INVARIANTS to be used?

Check, if yes

Attach FORMESH INVARIANTS AGENDUM SHEET following this sheet but before FORMESH sheets for each run.

Mesh to have $3ab \leq 7190$ (7097 if invariants are computed) or else enter b_{PHONY} on FORMESH run sheets.

All data are held from run to run except $(C_B)_0$ which if set differently from zero must be reset on each run.

Any quantity not entered will be assumed to be zero. Do not enter such quantities.

INTEGERS (Go among FORMESH Data)

Parameter	Address	Value
n	7297	
2^{10}_a	7298	
2^{10}_b	7299	
N_B	7300	
n'	7345	
$2^{10}_{a'}$	7346	
$2^{10}_{b'}$	7347	
$(C_B)_0$	7589	

FORMESH FUMBLEBUMPS (Program 60)
AGENDUM SHEET

FRACTIONS (Go among FORMESH Data)

Parameter	Address	Value	Parameter	Address	Value
e ₁	7253		e' ₁	7301	
f ₁	7254		f' ₁	7302	
g ₁	7255		g' ₁	7303	
h ₁	7256		h' ₁	7304	
e ₂	7257		e' ₂	7305	
f ₂	7258		f' ₂	7306	
g ₂	7259		g' ₂	7307	
h ₂	7260		h' ₂	7308	
e ₃	7261		e' ₃	7309	
f ₃	7262		f' ₃	7310	
g ₃	7263		g' ₃	7311	
h ₃	7264		h' ₃	7312	
e ₄	7265		e' ₄	7313	
f ₄	7266		f' ₄	7314	
g ₄	7267		g' ₄	7315	
h ₄	7268		h' ₄	7316	
e ₅	7269		e' ₅	7317	
f ₅	7270		f' ₅	7318	
g ₅	7271		g' ₅	7319	
h ₅	7272		h' ₅	7320	
e ₆	7273		e' ₆	7321	
f ₆	7274		f' ₆	7322	
g ₆	7275		g' ₆	7323	
h ₆	7276		h' ₆	7324	
e ₇	7277		e' ₇	7325	
f ₇	7278		f' ₇	7326	
g ₇	7279		g' ₇	7327	
h ₇	7280		h' ₇	7328	
α_x	7281		α'_x	7329	
α_y	7282		α'_y	7330	
β_x	7283		β'_x	7331	
β_y	7284		β'_y	7332	
γ_x	7285		γ'_x	7333	
γ_y	7286		γ'_y	7334	
δ_x	7287		δ'_x	7335	
δ_y	7288		δ'_y	7336	
Δx	7289		$\Delta x'$	7337	
Δy	7290		$\Delta y'$	7338	
Δp_x	7291		$\Delta p'_x$	7339	
Δp_y	7292		$\Delta p'_y$	7340	
r _x	7293		r' _x	7341	
r _y	7294		r' _y	7342	
s _x	7295		s' _x	7343	
s _y	7296		s' _y	7344	

January 30, 1957

MEMORANDUM

TO: All

FROM: Jim

To be attached to and become part of the already distributed description of FORMESH FUMBLEBUMPS, Program 60.

The memoranda L. Jackson Laslett to J. N. Snyder 28 December 1956 and A. M. Sessler to J. N. Snyder 22 March 1956 on which this program was based have been found to be lacking in generality (private communication L. J. Laslett to J. N. Snyder January 29, 1957). The program has been modified to supply this missing generality. Refer to the first four equations on the first page of the description. The change in the program will augment the four old variables by the quantities on the right hand sides of these equations rather than replace the old variables by these quantities.

MEMORANDUM

TO: Technical Staff

FROM: M. R. Storm - November 5, 1959

SUBJECT: Formesh Fumblebumps Smallerens

The "Smallerens" feature, which was added to such programs as Formesh and Forfixpoint, now has been appended also to the Formesh Fumblebumps program. Reviewing briefly, this device allows the number N (no. of sectors) to be smaller than π and avoid division hang-up on the computer.

No new parameters are necessary and the user continues to use the regular Formesh and Fumblebumps agendum forms. However, the word "Smallerens" should appear somewhere as part of the program name and #272 as the program number to indicate that smaller N's are desired.

This memo should be attached and become a part of the Formesh Fumblebumps report, MURA-234.

Alas, this feature is included in the Formesh Fumblebumps Forfixpoint program which is outlined in MURA-231. In this case, the new program name becomes Formesh Fumblebumps Forfixpoint Smallerens and the corresponding program number is #274.