OPTIMIZATION OF TEST PROBLEM: "GRAIN_SILO_V1.FOR"

PROBLEM DEVELOPED BY S. N. GHANI:

| INPUT PARAMETERS FOR OPTIMISATION SUBROUTINE EVOP | | | |
|--|-----------|---|----------------|
| REFLECTION COEFFICIENT | ALPHA | = | 0.1300000E+01 |
| CONTRACTION COEFFICIENT | BETA | = | 0.5000000E+00 |
| EXPANSION COEFFICIENT | GAMA | = | 0.2000000E+01 |
| EXPLICIT CONSTRAINT RETENTION COEFFICIENT | DEL | = | 0.1000000E-11 |
| ACCURACY PARAMETER FOR CONVERGENCE | PHI | = | 0.1000000E-09 |
| PARAMETER FOR DETERMINING COLLAPSE OF A COMPLEX IN A SUBSPACE | PHICPX | = | 0.1000000E-10 |
| GLOBAL LIMIT ON THE NUMBER OF CALLS TO FUNCTION SUBROUTINE | LIMIT | = | 6000 |
| NUMBER OF COMPLEX RESTARTS | NRSTRT | = | 10 |
| NUMBER OF CALLS TO FUNCTION SUBROUTINE AFTER WHICH CONVERGENCE TESTS ARE | MADE KNT | = | 25 |
| NUMBER OF CONSECUTIVE CONVERGENCE TEST_1 | ICON | = | 5 |
| NUMBER OF VARIABLES = NUMBER OF EXPLICIT CONSTRAINTS | N | = | 2 |
| NUMBER OF IMPLICIT CONSTRAINTS | NIC | = | 1 |
| NUMBER OF COMPLEX VERTICES | K | = | 4 |
| UPPER BOUND OF EXPLICIT CONSTRAINTS AT THE STARTING POINT | XMAX(1) | = | 0.1000000E+03 |
| | XMAX(2) | = | 0.1000000E+03 |
| LOWER BOUND OF EXPLICIT CONSTRAINTS AT THE STARTING POINT | XMIN(1) | = | 0.0000000E+00 |
| | XMIN(2) | = | 0.0000000E+00 |
| COORDINATES OF THE STARTING POINT | XT(1) | = | 0.99000000E+02 |
| | XT(2) | = | 0.99000000E+02 |
| UPPER BOUND OF IMPLICIT CONSTRAINTS AT THE STARTING POINT | XXMAX(1) | = | 0.1000000E+07 |
| LOWER BOUND OF IMPLICIT CONSTRAINTS AT THE STARTING POINT | XXMIN(1) | = | 0.25465500E+03 |
| IMPLICIT CONSTRAINTS AT THE STARTING POINT | XX(1) | = | 0.97029900E+06 |
| FUNCTION VALUE AT THE STARTING POINT | FF(1) | = | 0.34879408E+08 |
| | | | |

INITIAL COMPLEX CONFIGURATION

| VERTICE | NUMBER | FUNCTION VALUE | | COORDINATES | | | | |
|---------|--------|----------------|--------------|-------------|--------|----------------------|------------------|--|
| 1 | | 0.34879408E+08 | XT (XT (| 1) 2) | = = | 0.990000 0.990000 | 00E+02 00E+02 | |
| 2 | | 0.60895018E+07 | XT (XT (| 1) 2) | = = | 0.390200 0.325904 | 14E+02 34E+02 | |
| 3 | | 0.79175185E+07 | XT (XT (| 1) 2) | = | 0.443624 0.728610 | 85E+02 10E+02 | |
| 4 | | 0.60108599E+07 | XT (XT (| 1) 2) | = | 0.379037 0.716731 | 17E+02 85E+02 | |

| OUTPUT SUMMARY FROM SUBROUTINE EVOP | | | |
|---|----------------|----------------|-----------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF | F ACCURACY FOR | R CONVERGENCE. | . IER = 3 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | NFUNC = | - 14 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVER | RGENCE TESTS. | KUT = | 6 |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | KKT = 46 | 54 |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | M = 45 | 54 |
| COORDINATES OF THE MINIMUM | XT(1) = | 0.24365711 | E+01 |
| | XT(2) = | 0.42893751 | E+02 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F = | 0.24082830 |)E+06 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM | XX(1) = | 0.25465500 |)E+03 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM | XMAX(1) = | 0.1000000 |)E+03 |
| 2 | XMAX(2) = | 0.1000000 |)E+03 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM | XMIN(1) = | 0.0000000 |)E+00 |
| 2 | XMIN(2) = | 0.0000000 |)E+00 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XX | XMAX(1) = | 0.1000000 |)E+07 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XX | XMIN(1) = | 0.25465500 |)E+03 |

| VERTICE | NUMBER | FUNCTION VALUE | | COORDIN | IATES | |
|---------|--------|----------------|--------------|--------------|----------------------------------|--|
| 1 | | 0.24082831E+06 | XT (XT (| 1) = 2) = | 0.24367801E+01 0.42886394E+02 | |
| 2 | | 0.24082832E+06 | XT (XT (| 1) = 2) = | 0.24367878E+01 0.42886124E+02 | |
| 3 | | 0.24082830E+06 | XT (| 1) = | 0.24365711E+01 | |

| XT(2) = | 0.42893751E+02 |
|----------|----------------------------------|
| | |
| XT(1) = | 0.24366219E+01 |
| XT(2) = | 0.42891964E+02 |
| | XT(2) = XT(1) = XT(2) = |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

INITIAL COMPLEX CONFIGURATION

| VERTICE | NUMBER | FUNCTION VALUE | | COOF | RDIN | ATES | | |
|---------|--------|----------------|--------------|--------------|------|------------------------|------------------|--|
| 1 | | 0.24082830E+06 | XT (XT (| 1) = 2) = | = | 0.2436573 0.4289379 | 11E+01 51E+02 | |
| 2 | | 0.28719664E+08 | XT (XT (| 1) = 2) = | = | 0.900678 0.591227 | 87E+02 23E+02 | |
| 3 | | 0.75799265E+07 | XT (XT (| 1) = 2) = | = | 0.441253 0.326477 | 59E+02 17E+02 | |
| 4 | | 0.34715393E+08 | XT (XT (| 1) = 2) = | = | 0.987579' 0.987183' | 70E+02 75E+02 | |

| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIDED DECREE OF ACC | | V PO | | DOFNOR T | rp _ 9 |
|---|-------|-------|----------|------------|--------|
| MINIMON OF THE OBJECTIVE FUNCTION HAS BEEN BOCATED TO THE DESIRED DEGREE OF ACC | JILIA | .1 10 | IC CONVE | COBNCE. I | ER - 0 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | | 1 | NFUNC = | 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERGENC | E TE | ESTS. | KUT = | 6 | |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | | KKT = | 129 | |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | | M = | 122 | |
| COORDINATES OF THE MINIMUM XT(| 1) | = | 0.2 | 4363954E+0 | 1 |
| XT (| 2) | = | 0.43 | 2899940E+0 | 2 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F | = | 0.2 | 4082829E+0 | 6 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM XX(| 1) | = | 0.2 | 5465500E+0 | 3 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XMAX(| 1) | = | 0.1 | 000000E+0 | 3 |
| XMAX (| 2) | = | 0.1 | 000000E+0 | 3 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XMIN(| 1) | = | 0.0 | 000000E+0 | 0 |
| XMIN(| 2) | = | 0.0 | 000000E+0 | 0 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMAX(| 1) | = | 0.1 | 000000E+0 | 7 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMIN(| 1) | = | 0.2 | 5465500E+0 | 3 |

FINAL COMPLEX CONFIGURATION.

| VERTICE | NUMBER | FUNCTION VALUE | | COORDIN | NATES |
|---------|--------|----------------|--------------|--------------|----------------------------------|
| 1 | | 0.24082829E+06 | XT(XT(| 1) = 2) = | 0.24362155E+01 0.42906273E+02 |
| 2 | | 0.24082829E+06 | XT(XT(| 1) = 2) = | 0.24363845E+01 0.42900321E+02 |
| 3 | | 0.24082829E+06 | XT(XT(| 1) = 2) = | 0.24363954E+01 0.42899940E+02 |
| 4 | | 0.24082829E+06 | XT (XT (| 1) = 2) = | 0.24363818E+01 0.42900417E+02 |

*********** RESTARTING "EVOP" TO CHECK THE MINIMUM

| 1 | 0.24082829E+06 | |
|---|----------------|-------------------------|
| | | XT(1) = 0.24363954E+01 |
| | | XT(2) = 0.42899940E+02 |
| 2 | 0.27774585E+06 | |
| - | | XT(1) = 0.34884948E+01 |
| | | XT(2) = 0.32465607F+02 |
| | | AI(2) = 0.52105007E702 |
| 3 | 0.15186017E+08 | |
| | | XT(1) = 0.63397187E+02 |
| | | XT(2) = 0.88192660E+02 |
| 4 | 0.12901832E+08 | |
| | | XT(1) = 0.58581269E+02 |
| | | XT(2) = 0.57753694E+02 |
| | | 111(2) 01577550712.02 |

| OUTPUT SUMMARY FROM SUBROUTINE EVOP | | | | | |
|---|-------|---------|----------|--------------|--------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF . | ACCUI | RACY FO | OR CONVE | RGENCE. IJ | ER = 8 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | | | NFUNC = | 32 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERG | ENCE | TESTS | . KUT = | 7 | |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | | KKT = | 124 | |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | | M = | 120 | |
| COORDINATES OF THE MINIMUM | XT(1 | L) = | 0.2 | 24354696E+0 | 1 |
| | XT(2 | 2) = | 0.4 | 12932559E+02 | 2 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | | F = | 0.2 | 24082828E+0 | 5 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM | XX(1 | L) = | 0.2 | 25465501E+0 | 3 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XM | AX(1 | L) = | 0.1 | L000000E+0 | 3 |
| XM | AX(2 | 2) = | 0.1 | L000000E+0 | 3 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XM | IN(1 | L) = | 0.0 |)0000000E+0(| С |
| XM | IN(2 | 2) = | 0.0 |)0000000E+0(| С |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXM | AX(1 | L) = | 0.1 | L000000E+0' | 7 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXM | IN(1 | L) = | 0.2 | 25465500E+0 | 3 |
| | | | | | |

| VERTICE | NUMBER | FUNCTION | VALUE | | COO | RDIN | ATES | |
|---------|--------|-----------|--------|--------------|----------|------|--------------------|----------------------|
| 1 | | 0.2408282 | 29E+06 | XT (XT (| 1) 2) | = | 0.24356 0.42925 | 708E+01 467E+02 |
| 2 | | 0.2408282 | 28E+06 | XT (XT (| 1) 2) | = | 0.24354 0.42932 | 696E+01 559E+02 |
| 3 | | 0.2408282 | 29E+06 | XT (XT (| 1) 2) | = | 0.24360 0.42912 | 0404E+01 2449E+02 |
| 4 | | 0.2408282 | 29E+06 | XT (XT (| 1) 2) | = | 0.24360 0.42910 | 0890E+01 0736E+02 |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

| VERTICE | NUMBER | FUNCTION VALUE | | COORDIN | NATES |
|---------|--------|----------------|--------------|--------------|----------------------------------|
| 1 | | 0.24082828E+06 | XT (XT (| 1) = 2) = | 0.24354696E+01 0.42932559E+02 |
| 2 | | 0.20952329E+07 | XT (XT (| 1) = 2) = | 0.19290742E+02 0.95961219E+02 |
| 3 | | 0.51041450E+06 | XT (XT (| 1) = 2) = | 0.65068612E+01 0.59349820E+02 |
| 4 | | 0.20486242E+08 | XT (XT (| 1) = 2) = | 0.76160967E+02 0.13691035E+02 |

| OUTPU | UT SUMMARY FROM SUBROUTINE EVOP | | | | | | |
|-------|--|------------------|----------------|---------|------------|----------|-----|
| Μ | MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED T | O THE DESIRED D | EGREE OF ACCU | RACY FO | R CONVERGE | NCE. IER | = 8 |
| Т | TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | | | NFU | NC = | 31 |
| N | NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DU | JRING THE PRESEN | IT CONVERGENCE | TESTS. | KUT = | 6 | |
| N | NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUA | ATED | | | KKT = | 125 | |
| N | NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUA | ATED | | | M = | 121 | |
| C | COORDINATES OF THE MINIMUM | | XT (| 1) = | 0.2435 | 4696E+01 | |
| | | | XT (| 2) = | 0.4293 | 2559E+02 | |
| C | OBJECTIVE FUNCTION VALUE AT THE MINIMUM | | | F = | 0.2408 | 2828E+06 | |
| I | IMPLICIT CONSTRAINT VALUES AT THE MINIMUM | | XX (| 1) = | 0.2546 | 5501E+03 | |
| U | UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM | | XMAX (| 1) = | 0.1000 | 0000E+03 | |
| | | | XMAX (| 2) = | 0.1000 | 0000E+03 | |
| I | LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM | | XMIN(| 1) = | 0.0000 | 0000E+00 | |
| | | | XMIN(| 2) = | 0.0000 | 0000E+00 | |
| U | UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM | | XXMAX (| 1) = | 0.1000 | 0000E+07 | |
| I | LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM | | XXMIN(| 1) = | 0.2546 | 5500E+03 | |
| | | | | | | | |

| VERTICE | NUMBER | FUNCTION VALU | JE | COORDIN | NATES |
|---------|--------|---------------|------------------|--------------|----------------------------------|
| 1 | | 0.24082828E+0 |)6 XT(XT(| 1) = 2) = | 0.24354696E+01 0.42932559E+02 |
| 2 | | 0.24082829E+0 |)6 XT(XT(| 1) = 2) = | 0.24353795E+01 0.42935738E+02 |
| 3 | | 0.24082828E+0 |)6 XT(XT(| 1) = 2) = | 0.24354132E+01 0.42934551E+02 |
| 4 | | 0.24082828E+0 |)6 XT(XT(| 1) = 2) = | 0.24353421E+01 0.42937056E+02 |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

| VERTICE 1 | NUMBER | FUNCTION VA | LUE | | COORDINATES | | | | |
|-----------|--------|-------------|------|--------------|-------------|---|----------------------|-------------------|--|
| 1 | | 0.24082828E | +06 | XT (XT (| 1) 2) | = | 0.243546 0.429325 | 96E+01 59E+02 | |
| 2 | | 0.32817191E | +08 | XT (XT (| 1) 2) | = | 0.966974 0.569656 | 91E+02 49E+02 | |
| 3 | | 0.18222575E | +08 | XT (XT (| 1) 2) | = | 0.715164 0.164078 | 48E+02 61E+02 | |
| 4 | | 0.11609288E | :+08 | XT (XT (| 1) 2) | = | 0.547991 0.811241 | .45E+02 15E+02 | |

| OUTPUT SUMMARY FROM SUBROUTINE EVOP | | | |
|---|---------|----------------------|-------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF ACC | JRACY F | FOR CONVERGENCE. IEF | 2 = 8 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | NFUNC = | 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERGENC | E TESTS | 3. KUT = 6 | |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | KKT = 127 | |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | M = 120 | |
| COORDINATES OF THE MINIMUM XT(| 1) = | 0.24354696E+01 | |
| XT (| 2) = | 0.42932559E+02 | |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F = | 0.24082828E+06 | |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM XX(| 1) = | 0.25465501E+03 | |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XMAX(| 1) = | 0.1000000E+03 | |
|) XAMX | 2) = | 0.1000000E+03 | |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XMIN(| 1) = | 0.0000000E+00 | |
| XMIN(| 2) = | 0.0000000E+00 | |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMAX(| 1) = | 0.1000000E+07 | |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMIN | 1) = | 0.25465500E+03 | |
| | | | |

| VERTICE | NUMBER | FUNCTION VAL | JUE | CO | COORDINATES | |
|---------|--------|--------------|----------------|------------|-------------|----------------------------------|
| 1 | | 0.24082828E+ | 06 XT XT | (1) (2) | = = | 0.24354696E+01 0.42932559E+02 |
| 2 | | 0.24082829E+ | 06 XT XT | (1) (2) | = = | 0.24353492E+01 0.42936805E+02 |
| 3 | | 0.24082828E+ | 06 XT XT | (1) (2) | = = | 0.24354371E+01 0.42933705E+02 |
| 4 | | 0.24082829E+ | 06 XT XT | (1) | = | 0.24354748E+01 0.42932376E+02 |

*********** RESTARTING "EVOP" TO CHECK THE MINIMUM

INITIAL COMPLEX CONFIGURATION

| VERTICE | NUMBER | FUNCTION | VALUE | | COORDIN | NATES |
|---------|--------|-----------|-------|--------------|--------------|----------------------------------|
| 1 | | 0.2408282 | 8E+06 | XT (XT (| 1) = 2) = | 0.24354696E+01 0.42932559E+02 |
| 2 | | 0.3049742 | 3E+08 | XT (XT (| 1) = 2) = | 0.93552405E+02 0.31197381E+02 |
| 3 | | 0.8305050 | 7E+07 | XT (XT (| 1) = 2) = | 0.45212629E+02 0.90499336E+02 |
| 4 | | 0.5137425 | 6E+07 | XT (XT (| 1) = 2) = | 0.36082363E+02 0.20001413E+01 |

| OUTI | PUT SUMMARY FROM SUBROUTINE EVO |)P | | | | | | | |
|------|---------------------------------|-----------------|----------------|-------------|--------------|---------|---------|------------|---------|
| | MINIMUM OF THE OBJECTIVE FUNCT | FION HAS BEEN L | JOCATED TO THE | DESIRED DE | GREE OF ACCU | RACY FO | OR CONV | ERGENCE. | IER = 8 |
| | TOTAL NUMBER OF OBJECTIVE FUNC | CTION EVALUATIC | DN. | | | | | NFUNC = | 31 |
| | NUMBER OF TIMES THE SUBROUTINE | E FUNCTION IS C | CALLED DURING | THE PRESENT | CONVERGENCE | TESTS | . KUT = | 6 | |
| | NUMBER OF TIMES THE EXPLICIT C | CONSTRAINTS WER | RE EVALUATED | | | | KKT = | 128 | |
| | NUMBER OF TIMES THE IMPLICIT C | CONSTRAINTS WER | RE EVALUATED | | | | M = | 122 | |
| | COORDINATES OF THE MINIMUM | | | | XT (| 1) = | 0. | 24355234E- | +01 |
| | | | | | XT (| 2) = | 0. | 42930667E- | +02 |
| | OBJECTIVE FUNCTION VALUE AT TH | HE MINIMUM | | | | F = | 0. | 24082828E- | +06 |
| | IMPLICIT CONSTRAINT VALUES AT | THE MINIMUM | | | XX (| 1) = | 0. | 25465501E | +03 |
| | UPPER BOUNDS OF EXPLICIT CONST | FRAINTS AT THE | MINIMUM | | XMAX (| 1) = | 0. | 10000000E- | +03 |
| | | | | | XMAX (| 2) = | 0. | 10000000E | +03 |
| | LOWER BOUNDS OF EXPLICIT CONST | FRAINTS AT THE | MINIMIM | | XMIN(| 1) = | 0. | 00000000E | +00 |
| | | | | | XMIN(| 2) = | 0. | 00000000E | +00 |
| | UPPER BOUNDS OF IMPLICIT CONST | FRAINTS AT THE | MINIMUM | | XXMAX (| 1) = | 0. | 10000000E | +07 |
| | LOWER BOUNDS OF IMPLICIT CONST | FRAINTS AT THE | MINIMUM | | XXMIN(| 1) = | 0. | 25465500E- | +03 |
| | | | | | | | | | |

| VERTIC | E NUMBER | FUNCTION | VALUE | | COORDINATES | | IATES | 3 | |
|--------|----------|-----------|-------|--------------|-------------|---|------------------|------------------|------------|
| | 1 | 0.2408282 | 8E+06 | XT (XT (| 1) 2) | = | 0.2435 0.4293 | 5234E+ 0667E+ | +01 ⊦02 |
| | 2 | 0.2408282 | 8E+06 | XT (XT (| 1) 2) | = | 0.2435 0.4293 | 4001E+ 5011E+ | ⊦01 ⊦02 |
| | 3 | 0.2408282 | 9E+06 | XT (XT (| 1) 2) | = | 0.2435 | 4385E+ 3658E+ | ⊦01 ⊦02 |

| 0 | | | | |
|---|------|----|---|----------------|
| | XT (| 1) | = | 0.24355564E+01 |
| | XT (| 2) | = | 0.42929501E+02 |
| | | | | |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

4 0.24082829E+06

INITIAL COMPLEX CONFIGURATION

| VERTICE NUMBER | FUNCTION VALUE | COORDINATES |
|----------------|----------------|--|
| 1 | 0.24082828E+06 | XT(1) = 0.24355234E+01 XT(2) = 0.42930667E+02 |
| 2 | 0.26414685E+08 | XT(1) = 0.87259579E+02 XT(2) = 0.55562031E+01 |
| 3 | 0.88586299E+07 | XT(1) = 0.48001006E+02 XT(2) = 0.38000214E+02 |
| 4 | 0.32064649E+08 | XT(1) = 0.95992219E+02 XT(2) = 0.33951384E+02 |

| | IER = 8 |
|---|---------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF ACCURACY FOR CONVERGENCE. | |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. NFUNC = | 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERGENCE TESTS. KUT = 6 | |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED KKT = 126 | |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED M = 119 | |
| COORDINATES OF THE MINIMUM XT(1) = 0.24358707E+ | 01 |
| XT(2) = 0.42918423E + | 02 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM F = 0.24082828E+ | 06 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM XX(1) = 0.25465501E+ | 03 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XMAX(1) = 0.10000000E+ | 03 |
| XMAX(2) = 0.1000000E + | 03 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XMIN(1) = 0.00000000E+ | 00 |
| XMIN(2) = 0.0000000E+ | 00 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMAX(1) = 0.10000000E+ | 07 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMIN(1) = 0.25465500E+ | 03 |

FINAL COMPLEX CONFIGURATION.

| VERTICE | NUMBER | FUNCTION VAL | UE | CO | COORDINATES | |
|---------|--------|--------------|----------------|----------------|-------------|----------------------------------|
| 1 | | 0.24082828E+ | 06 דX דX | T(1) T(2) | = = | 0.24355234E+01 0.42930667E+02 |
| 2 | | 0.24082828E+ | 06 דX דX | T(1) T(2) | = = | 0.24356265E+01 0.42927029E+02 |
| 3 | | 0.24082828E+ | 06 רא רא | T(1) T(2) | = = | 0.24358707E+01 0.42918423E+02 |
| 4 | | 0.24082828E+ | 06 דא דא | T(1) T(2) | = | 0.24355128E+01 0.42931036E+02 |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

| VERTICE NUMBER | FUNCTION VALUE | COORDINATES |
|----------------|----------------|-------------|
| 1 | 0.24082828E+06 | |

| | | XT(1) = | 0.24358707E+01 |
|---|----------------|----------|----------------|
| | | XT(2) = | 0.42918423E+02 |
| | | | |
| 2 | 0.63035243E+07 | | |
| | | XT(1) = | 0.39778349E+02 |
| | | XT(2) = | 0.33107626E+02 |
| | | | |
| 3 | 0.66257920E+07 | | |
| | | XT(1) = | 0.40640625E+02 |
| | | XT(2) = | 0.45875120E+02 |
| | | | |
| 4 | 0.72465087E+06 | | |
| | | XT(1) = | 0.94851010E+01 |
| | | XT(2) = | 0.44034526E+02 |

| DUTPUT SUMMARY FROM SUBROUTINE EVOP | | |
|--|--|-----------------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO TH | E DESIRED DEGREE OF ACCURACY FOR CONVE | RGENCE. IER = 8 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | 1 | NFUNC = 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING | THE PRESENT CONVERGENCE TESTS. KUT = | 6 |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | KKT = | 120 |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | M = | 115 |
| COORDINATES OF THE MINIMUM | XT(1) = 0.2 | 4358707E+01 |
| | XT(2) = 0.4 | 2918423E+02 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F = 0.2 | 4082828E+06 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM | XX(1) = 0.2 | 5465501E+03 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM | XMAX(1) = 0.1 | 000000E+03 |
| | XMAX(2) = 0.1 | 000000E+03 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM | XMIN(1) = 0.0 | 0000000E+00 |
| | XMIN(2) = 0.0 | 0000000E+00 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM | XXMAX(1) = 0.1 | 0000000E+07 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM | XXMIN(1) = 0.2 | 5465500E+03 |
| | | |

| VERTICE | NUMBER | FUNCTION VALUE | | COORDIN | IATES |
|---------|--------|----------------|--------------|--------------|----------------------------------|
| 1 | | 0.24082828E+06 | XT (XT (| 1) = 2) = | 0.24358707E+01 0.42918423E+02 |
| 2 | | 0.24082831E+06 | XT (XT (| 1) = 2) = | 0.24355823E+01 0.42928602E+02 |
| 3 | | 0.24082828E+06 | XT (XT (| 1) = 2) = | 0.24358258E+01 0.42920005E+02 |
| 4 | | 0.24082828E+06 | XT (XT (| 1) = 2) = | 0.24355457E+01 0.42929880E+02 |

************ RESTARTING "EVOP" TO CHECK THE MINIMUM

| VERTICE | NUMBER | FUNCTION VALUE | | COORDIN | JATES |
|---------|--------|----------------|--------------|--------------|----------------------------------|
| 1 | | 0.24082828E+06 | XT (XT (| 1) = 2) = | 0.24358707E+01 0.42918423E+02 |
| 2 | | 0.22557864E+08 | XT (XT (| 1) = 2) = | 0.78841251E+02 0.76736766E+02 |
| 3 | | 0.96591935E+07 | XT (XT (| 1) = 2) = | 0.50849336E+02 0.14465114E+02 |
| 4 | | 0.37312220E+07 | XT (XT (| 1) = 2) = | 0.29146686E+02 0.44694087E+02 |

| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF ACC | URACY FO | R CONVERGENCE | . IER = 8 |
|---|----------|---------------|-----------|
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | NFUNC | = 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERGENC | E TESTS. | KUT = | 6 |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | KKT = 1 | 26 |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | M = 1 | 22 |
| COORDINATES OF THE MINIMUM XT(| 1) = | 0.2435892 | 4E+01 |
| XT (| 2) = | 0.4291765 | 3E+02 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F = | 0.2408282 | 3E+06 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM XX(| 1) = | 0.2546550 |)E+03 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XMAX(| 1) = | 0.1000000 |)E+03 |
| XMAX (| 2) = | 0.1000000 |)E+03 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XMIN(| 1) = | 0.000000 |)E+00 |
| XMIN(| 2) = | 0.000000 |)E+00 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMAX(| 1) = | 0.1000000 |)E+07 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMIN(| 1) = | 0.2546550 |)E+03 |

VERTICE NUMBER
FUNCTION VALUE
COORDINATES

1
0.24082828E+06 XT(1) = 0.24358924E+01XT(2) = 0.42917658E+02

2
0.41689066E+06 XT(1) = 0.58443494E+01XT(2) = 0.32819304E+02

3
0.78877793E+07 XT(1) = 0.44316673E+02XT(2) = 0.70526320E+02

4
0.26290223E+07 XT(1) = 0.24307834E+02XT(2) = 0.11110146E+02

************* RESTARTING "EVOP" TO CHECK THE MINIMUM

VERTICE NUMBER FUNCTION VALUE

INITIAL COMPLEX CONFIGURATION

OUTPUT SUMMARY FROM SUBROUTINE EVOP

| 1 | 0.240929297 | | |
|---|----------------|----------|----------------|
| 1 | 0.24002020100 | XT(1) = | 0.24358707E+01 |
| | | XT(2) = | 0.42918423E+02 |
| 2 | 0 240828285+06 | | |
| 2 | 0.21002020100 | XT(1) = | 0.24358924E+01 |
| | | XT(2) = | 0.42917658E+02 |
| 3 | 0 240828285+06 | | |
| 5 | 0.21002020100 | XT(1) = | 0.24359286E+01 |
| | | XT(2) = | 0.42916384E+02 |
| 4 | 0 240828285+06 | | |
| т | 0.240020202400 | XT(1) = | 0.24358793E+01 |
| | | XT(2) = | 0.42918120E+02 |
| | | | |

FINAL COMPLEX CONFIGURATION.

| OUTPUT SUMMARY FROM SUBROUTINE EVOP | | |
|---|-------|----------------------------|
| MINIMUM OF THE OBJECTIVE FUNCTION HAS BEEN LOCATED TO THE DESIRED DEGREE OF ACC | JRACY | Y FOR CONVERGENCE. IER = 8 |
| TOTAL NUMBER OF OBJECTIVE FUNCTION EVALUATION. | | NFUNC = 31 |
| NUMBER OF TIMES THE SUBROUTINE FUNCTION IS CALLED DURING THE PRESENT CONVERGENC | TES | STS. KUT = 6 |
| NUMBER OF TIMES THE EXPLICIT CONSTRAINTS WERE EVALUATED | | KKT = 124 |
| NUMBER OF TIMES THE IMPLICIT CONSTRAINTS WERE EVALUATED | | M = 118 |
| COORDINATES OF THE MINIMUM XT(| 1) = | = 0.24358924E+01 |
|) TX | 2) = | = 0.42917658E+02 |
| OBJECTIVE FUNCTION VALUE AT THE MINIMUM | F = | = 0.24082828E+06 |
| IMPLICIT CONSTRAINT VALUES AT THE MINIMUM XX(| 1) = | = 0.25465500E+03 |
| UPPER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMUM XMAX(| 1) = | = 0.1000000E+03 |
|) XAMX | 2) = | = 0.1000000E+03 |
| LOWER BOUNDS OF EXPLICIT CONSTRAINTS AT THE MINIMIM XMIN(| 1) = | = 0.0000000E+00 |
| XMIN(| 2) = | = 0.0000000E+00 |
| UPPER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMAX(| 1) = | = 0.1000000E+07 |
| LOWER BOUNDS OF IMPLICIT CONSTRAINTS AT THE MINIMUM XXMIN(| 1) = | = 0.25465500E+03 |
| | | |

COORDINATES

| VERTICE NUMBER | FUNCTION VALUE | COORDINATES |
|----------------|----------------|--|
| 1 | 0.24082828E+06 | XT(1) = 0.24358924E+01 XT(2) = 0.42917658E+02 |
| 2 | 0.24082828E+06 | XT(1) = 0.24358985E+01 XT(2) = 0.42917443E+02 |
| 3 | 0.24082828E+06 | XT(1) = 0.24359229E+01 |
| 4 | 0.24082828E+06 | XT(2) = 0.42916585E+02 |
| | | XT(1) = 0.24358537E+01 XT(2) = 0.42919022E+02 |