

HARMON AND MAD403 REVISIONS

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HARMON AND MAD403 REVISIONS

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This note describes the revisions [November 1985] of HARMON and MAD programs, as well as modifications of these programs to allow for larger lattices [e.g. MAD403LL for SSC or MAD403L for RHIC , etc.] and parallel inputing to (MAD403 and program) SYNCH [e.g. [PARSA1.MAD.SOURCE]MAD403LG.EXE].

INTRODUCTION:

MAD403 is the package of lattice design and particle tracking modules that includes HARMON and reads the standard format.

In AUGUST 1985, I received MAD403 and program HARMON stand alone (which I now refer to as MAD403A and HARMONA in [PARSA1.MAD] and [PARSA1.HARMON] directories) from M. Donold (SLAC). We recently (Nov. 1985) received M. Donold's revision to these programs which I now refer to as MAD403 and HARMON in Accelerator Physics Data Base [PRSA1.MAD] and [PARSA1.HARMON] directories. The revision made is in HARMON routine of MAD403; hence in HARMON stand alone. For your convenience, the executable copies of these (revised) programs are also made available in the Data Base and can be accessed from:
[PARSA1.MAD]MAD403.EXE and [PARSA1.HARMON]HARMON.EXE.

In section I, MAD403.DIF gives the revision of HARMON routine. Sections II and III shows the modifications we made to allow: A) for larger lattices [e.g. MAD403L.DIF], and B) for parallel inputing to program SYNCH. In that MAD403LG.DIF shows how, the arithmetic expressions in sec 3.3 were expanded, and the geometirc functions were added to allow the parallel inputing to MAD403 and program SYNCH [which contains geometric functions where as MAD403 does not].

Finally, [PARSA1.MAD]READ.ME, and [PARSA1.HRMON]READ.ME in the Accelerator Physics Data Base, provides detailed instruction and information on these programs.

I. MAD403.DIF

This is the difference between the previous version of MAD403A.FOR received AUGUST 1985 [from MARTIN DONOLD, SLAC] and the the new version [for clarity we will refer to as] MAD403.FOR, received NOVEMBER 1985.
[Z.P.]

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
  349          WRITE (9,910) KVERS
```

```
  350          CALL TIMEX(TIME)
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403A.FOR;2
  349          WRITE (9,910) KVERS,KDATE,KTIME
  350          CALL TIMEX(TIME)
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
7976         IF (STK1(I) .EQ. 0.) THEN
7977             STK(I) = XX(NN)
7978         ELSE
7979             STK(I)=STK1(I)*XX(NN)
7980         ENDIF
7981         ELSE
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403A.FOR;2
7976         STK(I)=STK1(I)*XX(NN)
7977         ELSE
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
11277        IF (DDMAG .LT. 1.D38) DDMAG = DDMAG + DDMAG
11278        IF (DDMAX-DMAX) 90,90,230
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403A.FOR;2
11273        DDMAG=DDMAG+DDMAG
11274        IF (DDMAX-DMAX) 90,90,230
```

Number of difference sections found: 3

Number of difference records found: 7

```
DIFFERENCES /IGNORE=()/MERGED=1/OUTPUT=-
DUA0:[PARSA1.MAD.SOURCE]MAD403.DIF;1-
DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1-
DUA0:[PARSA1.MAD.SOURCE]MAD403A.FOR;2
```

II. MAD403L.DIF

This file shows the difference between the MAD403.FOR,
and MAD403L.FOR.

MAD403L is the modified version of MAD403.FOR, where
we increased the dimension to 1800 elements, to allow
inputing for larger lattices.

[For more information see [PARSA1.MAD]READ.ME].

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
```

```
6368      PARAMETER (MAXL = 600, MAXS = 300)
6369      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
6368      PARAMETER (MAXL = 1800, MAXS = 1000)
6369      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
6487      PARAMETER (MAXL = 600, MAXS = 300)
6488      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
6487      PARAMETER (MAXL = 1800, MAXS = 1000)
6488      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
6660      PARAMETER (MAXL = 600, MAXS = 300)
6661      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
6660      PARAMETER (MAXL = 1800, MAXS = 1000)
6661      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
7501      PARAMETER (MAXL = 600, MAXS = 300)
7502      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
7501      PARAMETER (MAXL = 1800, MAXS = 1000)
7502      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
8128      PARAMETER (MAXL = 600, MAXS = 300)
8129      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
8128      PARAMETER (MAXL = 1800, MAXS = 1000)
8129      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
8250      PARAMETER (MAXL = 600, MAXS = 300)
8251      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
8250      PARAMETER (MAXL = 1800, MAXS = 1000)
8251      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
8487      PARAMETER (MAXL = 600, MAXS = 300)
```

```
8488          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
8487          PARAMETER (MAXL = 1800, MAXS = 1000)
8488          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
8680          PARAMETER (MAXL = 600, MAXS = 300)
8681          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
8680          PARAMETER (MAXL = 1800, MAXS = 1000)
8681          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
8883          PARAMETER (MAXL = 600, MAXS = 300)
8884          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
8883          PARAMETER (MAXL = 1800, MAXS = 1000)
8884          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
9144          PARAMETER (MAXL = 600, MAXS = 300)
9145          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
9144          PARAMETER (MAXL = 1800, MAXS = 1000)
9145          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
9237          PARAMETER (MAXL = 600, MAXS = 300)
9238          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
9237          PARAMETER (MAXL = 1800, MAXS = 1000)
9238          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
9365          PARAMETER (MAXL = 600, MAXS = 300)
9366          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
9365          PARAMETER (MAXL = 1800, MAXS = 1000)
9366          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
9827          PARAMETER (MAXL = 600, MAXS = 300)
9828          COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
```

```
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
 9827      PARAMETER (MAXL = 1800, MAXS = 1000)
 9828      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10261     PARAMETER (MAXL = 600, MAXS = 300)
10262     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10261     PARAMETER (MAXL = 1800, MAXS = 1000)
10262     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10402     PARAMETER (MAXL = 600, MAXS = 300)
10403     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10402     PARAMETER (MAXL = 1800, MAXS = 1000)
10403     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10529     PARAMETER (MAXL = 600, MAXS = 300)
10530     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10529     PARAMETER (MAXL = 1800, MAXS = 1000)
10530     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10612     PARAMETER (MAXL = 600, MAXS = 300)
10613     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10612     PARAMETER (MAXL = 1800, MAXS = 1000)
10613     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10711     PARAMETER (MAXL = 600, MAXS = 300)
10712     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10711     PARAMETER (MAXL = 1800, MAXS = 1000)
10712     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
*****
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10738     PARAMETER (MAXL = 600, MAXS = 300)
10739     COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
```



```
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10738      PARAMETER (MAXL = 1800, MAXS = 1000)
10739      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
```

```
*****
*****
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
10908      PARAMETER (MAXL = 600, MAXS = 300)
10909      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
*****
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
10908      PARAMETER (MAXL = 1800, MAXS = 1000)
10909      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
```

```
*****
*****
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1
11102      PARAMETER (MAXL = 600, MAXS = 300)
11103      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
```

```
*****
```

```
File DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
11102      PARAMETER (MAXL = 1800, MAXS = 1000)
11103      COMMON /WORKC/      ID(MAXL),LNAM(MAXS)
```

```
*****
```

```
Number of difference sections found: 21
Number of difference records found: 21
```

```
DIFFERENCES /IGNORE=()/MERGED=1/OUTPUT=-
DUA0:[PARSA1.MAD.SOURCE]MAD403L.DIF;1-
DUA0:[PARSA1.MAD.SOURCE]MAD403.FOR;1-
DUA0:[PARSA1.MAD.SOURCE]MAD403L.FOR;1
```

III. MAD403LG.DIF

This file shows the difference between the MAD403.FOR and its modified version MAD403LG.FOR. In that, the Arithmetic expressions in section 3.3 were expanded and geometric functions were added in obtaining MAD403GL.FOR.

Hence the following lines were added to MAD403.FOR to allow for parallel inputing to SYNCH and MAD (i.e. addition of TAN,ASIN,ATAN etc). This modified version, I originally called MAD403SYNCH.FOR. But since this name was too Long I have refered to it as MAD403LG.FOR (L for Long, and G for the added Geometric functions).

```
*****
```

```

1956      PARAMETER          (NFUN = 9)    ! OLD NFUN = 6
*****
1967      DATA KFUN(7)      / 'TAN      ' /
1968      DATA KFUN(8)      / 'ASIN    ' /
1969      DATA KFUN(9)      / 'ATAN    ' /
*****
4402      +                210,220,230,240,250,260,270,280,290,300), ITYPE
*****
4447      GO TO 500
4448      280      PDATA(IPARM) = TAN(PDATA(IOP2))
4449      GO TO 500
4450      290      IF(PDATA(IOP2).GT.1.) THEN
4451                      WRITE(IECHO,940)
4452                      PDATA(IPARM)=ASIN(1.)
4453                      GO TO 500
4454      ELSEIF(PDATA(IOP2).LT.-1.) THEN
4455                      WRITE(IECHO,950)
4456                      PDATA(IPARM)=ASIN(-1.)
4457                      GO TO 500
4458      ENDIF
4459      PDATA(IPARM) = ASIN(PDATA(IOP2))
4460      GO TO 500
4461      300      PDATA(IPARM) = ATAN(PDATA(IOP2))
*****
4473      940 FORMAT('0** WARNING ** ASIN OF A NUMBER > 1. -----',
4474      +          'THE NUMBER SET TO 1' )
4475      950 FORMAT('0** WARNING ** ASIN OF A NUMBER < -1. -----',
4476      +          'THE NUMBER SET TO -1' )
*****
4610      DATA KOPER(18)    / 'TAN      ' /
4611      DATA KOPER(19)    / 'ASIN    ' /
4612      DATA KOPER(20)    / 'ATAN    ' /
*****

```