

## Appendix-C

**Programme of Lagranges's formula with Pade approximation for  
interpolating mass ratio ( $m^*/m_e$ ) as a function of frequency ( $\omega$ ).**

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C  LANGRAGE'S FROMULA WITH PADE APPROXIMATION WITH
C  PADE APPROXIMATION FOR RATIONAL FUNCTION
C  TO PLOT RATIO OF MASS V/S FREQUENCY
C  ITERATION METHOD
  IMPLICIT DOUBLE PRECISION(A-H,O-Z)
  OPEN(3,FILE='MAS1.DAT', STATUS='NEW')
  DO 10 I=8,150
C  X=FREQUENCY
C  Y=RATIO OF MASS
  X=FLOAT(I)*0.001
  CALL POLINT(16,X,Y)
  ALP=Y
  WRITE(3,*)X,ALP
10  CONTINUE
  STOP
  END

  SUBROUTINE POLINT(N,X,Y)
  IMPLICIT DOUBLE PRECISION (A-H,O-Z)
  PARAMETER (NMAX=16)
  DIMENSION XA(16),YA(16),C(NMAX),D(NMAX)
  SAVE XA,YA
C  YA=RATIO OF MASS
C  XA=FREQUENCY
  DATA YA/33.56,32.4,25.56,17.7,16.91,16.16,15.4,14.65,13.89
  1 ,13.13,12.37,11.62,10.86,10.10,9.8,9.345/
  DATA XA/.01,.0122,.025,.0397,.05,.06,.07,.08,.09,.1,.11,.12
  2 ,.13,.14,.144,.15/
  DIF=ABS(X-XA(1))
  NS=1
  DO 11 I=1,N
    DIFT=ABS(X-XA(I))
    IF (DIFT.LT.DIF) THEN
      NS=I
      DIF=DIFT
    ENDIF
    C(I)=YA(I)
    D(I)=YA(I)
11  CONTINUE
  Y=YA(NS)
  NS=NS-1
  DO 13 M=1,N-1
    DO 12 I=1,N-M
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HO=XA(I)-X
HP=XA(I+M)-X
W=C(I+1)-D(I)
DEN=HO-HP
IF(DEN.EQ.0.)PAUSE
DEN=W/DEN
D(I)=HP*DEN
C(I)=HO*DEN
12 CONTINUE
IF (2*NS.LT.N-M)THEN
  DY=C(NS+1)
ELSE
  DY=D(NS)
  NS=NS-1
ENDIF
Y=Y+DY
13 CONTINUE
RETURN
END
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