

APPENDIX I

MAIN PROGRAM

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FORTRAN IV      MODEL 44

0001              DIMENSION RR (64), RI (64)
0002              COMPLEX X (64)
0003              J = 1
0004              T = 4.0
0005              200 N = 32
0006              M = 5
0007              100 DELT = T/N
0008              DELW = 6.28318530/T
0009              N1 = N/4.1
0010              DO 10 I = 1, N1
0011              10 X (I) = (1.0, 0.0)
0012              N3 = 3*N/4 + 1
0013              DO 20 I = N3, N
0014              20 X (I) = (1.0, 0.0)
0015              N2 = N1 + 1
0016              N4 = N3 - 1
0017              DO 15 I = N2, N4
0018              15 X (I) = (0.0, 0.0)
0019              IF (J.GT.2) GO TO 40
0020              X (N3) = (0.5, 0.0)
0021              X (N1) = (0.5, 0.0)
0022              GO TO 45
0023              40 X (N3) = (0.0, 0.0)
0024              X (N1) = (1.0, 0.0)
0025              45 DO 30 I = 1, N
0026              30 RR (I) = REAL (X (I))
0027              WRITE (6, 25) N
0028              25 FORMAT (45 X, ' RECTANGULAR
                   SAMPLES FOR N# ', 13)
0029              CALL GRAPH (RR, N, DELT, 1)
0030              SIGN = - 1.0
0031              CALL FFT (N, M, X, SIGN, T)
0032              PRINT 1
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0033      1  FORMAT (50X, 'FOURIER TRANS-
          FORM ')
0034      CALL GRAPHC (X, RR, RI, N, DELW
          1)
0035      IF (J.EQ.2.OR.J.EQ.4) GO TO 35
0036      J = J + 1
0037      N = 64
0038      M = 6
0039      GO TO 100
0040      35  IF (J.EQ.4) GO TO 50
0041      J = J + 1
0042      GO TO 200
0043      50  CONTINUE
0044      STOP
0045      END

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APPENDIX II

SUBROUTINE FOR FAST FOURIER TRANSFORM

FORTRAN IV MODEL 44

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0001      SUBROUTINE FFT (N, M, X1, SIGN, T)
0002      DIMENSION X1 (600), X2 (600)
0003      COMPLEX X1, X2, W, X1K3
0004      DO 10 J = 1, M
0005      I2J = 2**J
0006      N2J = N/I2J
0007      N2 = I2J/2
0008      N1 = N2J
0009      DO 20 I = 1, N2
0010      IN2J = (I - 1)* N2J
0011      PI2N = 6.2832/N
0012      ARG = PI2N*IN2J*SIGN
0013      W = COS (ARG) + (0.0, 1.0)*SIN (ARG)
0014      DO 20 K = 1, N1
0015      K1 = K+IN2J
0016      K2 = K+IN2J*2
0017      K3 = K2 + N2J
0018      K4 = K1 + N/2
0019      X1K3 = W*X1 (K3)

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0020      X2 (K1) = X1 (K2) + X1K3
0021      X2 (K4) = X1 (K2) - X1K3
0022      20  CONTINUE
0023      DO 10 K = 1, N
0024      10  X1 (K) = X2 (K)
0025      IF (SIGN.EQ.1.0) GO TO 50
0026      DO 40 K=1, N
0027      40  X1 (K) = X1 (K)*T/N
0028      50  CONTINUE
0029      RETURN
0030      END

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APPENDIX III

SUBROUTINE GRAPHC (FOR COMPLEX DATA)

FORTRAN IV MODEL 44

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0001      SUBROUTINE GRAPHC (DATA, AR,
           AI, N, DELX, M1)
0002      COMPLEX DATA
0003      DIMENSION DATA (N), AR (N), AI (N)
0004      DO 1 I = 1, N
0005      AR (I) = REAL (DATA (I))
0006      1  AI (I) = AIMAG (DATA (I))
0007      WRITE (6, 10)
0008      10  FORMAT (1H1, 50X, ' REAL PART ')
0009      CALL GRAPH (AR, N, DELX, M1)
0010      WRITE (6, 11)
0011      11  FORMAT (1H1, 48X, ' IMAGINARY
           PART ')
0012      CALL GRAPH (AI, N, DELX, M1)
0013      RETURN
0014      END

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SUBROUTINE FOR PLOTTING GRAPH

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0001      SUBROUTINE GRAPH (ADATA, N,
           DELX, M1)
0002      DIMENSION ALINE (114), ADATA (N)
0003      DATA DOT, STAR, BLANK/' . ', '* ', '/'

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0004      N1 = N-1
0005      ALGST = ADATA (1)
0006      ALEST = ADATA (1)
0007      DO 20 I = 1, N1
0008      B1 = ADATA (I + 1) - ALGST
0009      B2 = ADATA (I + 1) - ALEST
0010      IF (B1, GE.0.0) ALGST = ADATA (I+1)
0011      IF (B2, LE.0.0) ALEST = ADATA (I + 1)
0012      20  CONTINUE
0013      AA = ALGST - ALEST
0014      XMIN = FLOAT (1 - M1)* DELX
0015      XMAX = FLOAT (N-M1)*DELX
0016      WRITE (6, 12) ALEST, ALGST, XMIN,
           XMAX
0017      12  FORMAT (1H1, 5X, ' MINIMUM Y# '
           E15.7, 3X, ' MAXIMUM Y# '
           1  E15.7, 3X, ' MINIMUM X# '
           E15.7, 3X, ' MAXIMUM X# ' E15.7)
0018      101 FORMAT (1H, 114A1, 2X, E14.7)
0019      IF (M1.GT.0.AND.M1.LE.N) GO
           TO 50
0020      DO 11 J = 1, 114
0021      11  ALINE (J) = DOT
0022      WRITE (6, 101) ALINE
0023      50  II = 1.-113.*ALEST/AA
0024      IF (II.LT.1) II = 1
0025      DO 33 I = 1, N
0026      DO 34 J = 1, 114
0027      34  ALINE (J) = BLANK
0028      IF (I.NE.M1) GO TO 52
0029      DO 36 J = 1, 114
0030      36  ALINE (J) = DOT
0031      52  JJ = 1.+113.*(ADATA (I)-ALEST)/AA
0032      45  ALINE (II) = DOT
0033      ALINE (JJ) = STAR
0034      WRITE (6, 101) ALINE, ADATA (I)
0035      33  CONTINUE
0036      111 RETURN
0037      END

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