APPENDIX I-B LIST OF ARGUMENTS FOR ZXMIN

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A description of the arguments used in ZXMIN is given here. For more details, the user should consult the IMSL Library Reference Manual published by IMSL, Houston, Texas.

IMSL ROUTINE NAME - ZXMIN

PURPOSE

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MINIMUM OF A FUNCTION OF N VARIABLES USING A QUAS I-NEWTON MEHTOD

USAGE CALL ZXMIN (FUNCT, N, NSIG, MAXFN, IOPT, X, H, G, F, W, IER)

- A USER SUPPLIED SUBROUTINE WHICH CALCULATES THE FUNCTION ARGUMENTS FUNCT F FOR GIVEN PARAMETER VALUES $X(1), X(2), \dots, X(N)$ WHERE X IS A VECTOR OF LENGTH N. FUNCT MUST APPEAR IN AN EXTERNAL STATEMENT IN THE CALLING PROGRAM. FUNCT MUST NOT ALTER THE VALUES OF X(I), I=1,..., N OR N.
 - N THE NUMBER OF PARAMETERS (I.E., THE LENGTH OF X) (INPUT) NSIG CONVERGENCE CRITERION. (INPUT). THE NUMBER OF DIGITS OF
 - ACCURACY REQUIRED IN THE PARAMETER ESTIMATES. THIS CONVERGENCE CONDITION IS SATISFIED IF ON TWO SUCCESSIVE ITERATIONS, THE PARAMETER ESTIMATES (I.E., X(I), I=1, ..., N) AGREE, COMPONENT BY COMPONENT, TO NSIG DIGITS.
 - MAXFN -MAXIMUM NUMBER OF FUNCTION EVALUATIONS (I.E., CALLS TO SUBROUTINE FUNCT) ALLOWED. (INPUT) IOPT
 - (INPUT) OPTIONS SELECTOR.
 - IOPT = 0 CAUSES ZXMIN TO INITIALIZE THE HESSIAN MATRIX H TO THE IDENTITY MATRIX.
 - IOPT = 1 INDICATES THAT H HAS BEEN INITIALIZED BY THE USER TO A POSITIVE DEFINITE MATRIX.
 - VECTOR OF LENGTH N CONTAINING PARAMETER VALUES. ON INPUT, X MUST CONTAIN THE INITIAL PARAMETER ESTIMATES.
 - ON OUTPUT, X CONTIANS THE FINAL PARAMETER ESTIMATES AS DETERMINED BY ZXMIN.
 - VECTOR OF LENGTH N* (N+1)2 CONTAINING AN ESTIMATE OF THE HESSIAN MATRIX
 - D**2F/(DX(I)DX(J)),I,J=1,...,N.
 - H IS STORED IN SYMMETRIC STORAGE MODE.
 - ON INPUT, IF IOPT = 0, ZXMIN INITIALIZES H TO THE IDENTITY MATRIX. AN INITIAL SETTING OF H BY THE USER IS INDICATED BY IOPT=1. H MUST BE POSITIVE DEFINITE. IF IT IS NOT, A TERMINAL
 - ERROR OCCURS.
 - ON OUTPUT, H CONTAINS AN ESTIMATE OF THE HESSIAN AT THE FINAL PARAMETER ESIMATES (I.E., AT X(1), X(2), ..., X(N))
 - A VECTOR OF LENGTH N CONTAINING AN ESTIMATE OF THE GRADIENT DF/DX(I), I=1, ..., N AT THE FINAL PARAMETER ESTIMATES. (OUTPUT)

- F A SCALAR CONTAINING THE VALUE OF THE FUNCTION AT THE FINAL PARAMETER ESTIMATES. (OUTPUT)
- W A VECTOR OF LENGTH 3*N USED AS WORKING SPACE.
 - ON OUTPUT, WORK(I), CONTAINS FOR
 - I = 1, THE NORM OF THE GRADIENT (I.E.,
 - SQRT(G(1)**2+G(2)**2+_{•••}+G(N)**2))
 - I = 2, THE NUMBER OF FUNCTION EVALUATIONS PERFORMED.
 - I = 3, AN ESTIMATE OF THE NUMBER OF SIGNIFICANT DIGITS IN THE FINAL PARAMETER ESTIMATES.
- IER -
- ERROR PARAMETER (OUTPUT)
 - IER = 0 IMPLEIS THAT CONVERGENCE WAS ACHIEVED AND NO ERRORS OCCURED.
- TERMINAL ERROR
 - IER = 129 IMPLIES THAT THE INITIAL HESSIAN MATRIX IS NOT POSITIVE DEFINITE. THIS CAN OCCUR ONLY FOR IOPT = 1_{\bullet}
 - IER = 130 IMPLIES THAT THE ITERATION WAS TERMINATED DUE TO ROUNDING ERRORS BECOMING DOMINANT. THE PARAMETER ESTIMATES HAVE NOT BEEN DETERMINED TO NSIG DIGITS.
 - IER = 131 IMPLIES THAT THE ITERATION WAS TERMINATED BECAUSE MAXFN WAS EXCEEDED.