

PEST RUN RECORD: CASE mfit

PEST Version: 16.1

PEST run mode:-

Parameter estimation mode

Case dimensions:-

Number of parameters	:	12
Number of adjustable parameters	:	12
Number of parameter groups	:	1
Number of observations	:	500
Number of prior estimates	:	0

Model command line(s):-

MDP_2RNE

Jacobian command line:-

MDP_2RNE /d
Jacobian read from file Deriv.txt
This is an ASCII file.

Model interface files:-

Templates:
MFIT.tpl
for model input files:
Input.txt

(Parameter values written using single precision protocol.)
(Decimal point always included.)

Instruction files:
MFIT.ins
for reading model output files:
Output.txt

PEST-to-model message file:-

na

Singular value decomposition:-

Perform SVD on $XtQX$ or $Q^{(1/2)}X$:	$Q^{(1/2)}X$
Max. number of singular values to employ	:	12
Ratio of lowest/highest singular value	:	5.000000E-07
Record eigenvectors in SVD file	:	yes

Derivatives calculation:-

Param group	Increment type	Increment	Increment low bound	Forward or central switch	Multiplier (central)	Method (central)
pgnam	relative	1.0000E-02	none	switch	1.500	parabolic

Parameter definitions:-

Name	Trans-formation	Change limit	Initial value	Lower bound	Upper bound
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74	h1	log	factor	80.0000	80.0000	110.000
75	s1	log	factor	2500.00	1.00000	5000.00
76	p1	log	factor	0.850000	0.100000	0.999000
77	o1	log	factor	3.300000E-04	1.000000E-10	1.000000E-02
78	h2	log	factor	130.000	120.000	140.000
79	s2	log	factor	750.000	1.00000	5000.00
80	p2	log	factor	0.780000	0.100000	0.999000
81	o2	log	factor	1.600000E-05	1.000000E-10	1.000000E-02
82	h3	log	factor	170.000	160.000	180.000
83	s3	log	factor	800.000	1.00000	5000.00
84	p3	log	factor	0.300000	0.100000	0.999000
85	o3	log	factor	3.500000E-05	1.000000E-10	1.000000E-02

86						
87	Name	Group	Scale	Offset	Model	command number
88	h1	pgnam	1.00000	0.00000	1	
89	s1	pgnam	1.00000	0.00000	0	
90	p1	pgnam	1.00000	0.00000	1	
91	o1	pgnam	1.00000	0.00000	0	
92	h2	pgnam	1.00000	0.00000	1	
93	s2	pgnam	1.00000	0.00000	0	
94	p2	pgnam	1.00000	0.00000	1	
95	o2	pgnam	1.00000	0.00000	0	
96	h3	pgnam	1.00000	0.00000	1	
97	s3	pgnam	1.00000	0.00000	0	
98	p3	pgnam	1.00000	0.00000	1	
99	o3	pgnam	1.00000	0.00000	0	

100

101

102 Prior information:-

103

104 No prior information supplied

105

106

107 Observations:-

108

109	Observation name	Observation	Weight	Group
110	o1	1.762070E-39	1.000	conc
111	o2	2.325900E-39	1.000	conc
112	o3	0.00000	1.000	conc
113	o4	0.00000	1.000	conc
114	o5	3.238130E-38	1.000	conc
115	o6	0.00000	1.000	conc
116	o7	0.00000	1.000	conc
117	o8	1.655480E-37	1.000	conc
118	o9	4.515590E-37	1.000	conc
119	o10	0.00000	1.000	conc
120	o11	0.00000	1.000	conc
121	o12	5.727360E-36	1.000	conc
122	o13	3.627010E-37	1.000	conc
123	o14	0.00000	1.000	conc
124	o15	2.050830E-35	1.000	conc
125	o16	9.343950E-35	1.000	conc
126	o17	0.00000	1.000	conc
127	o18	0.00000	1.000	conc
128	o19	9.801770E-34	1.000	conc
129	o20	4.660000E-34	1.000	conc
130	o21	0.00000	1.000	conc
131	o22	1.878980E-33	1.000	conc
132	o23	1.850280E-32	1.000	conc
133	o24	0.00000	1.000	conc
134	o25	0.00000	1.000	conc
135	o26	1.611970E-31	1.000	conc
136	o27	1.509350E-31	1.000	conc
137	o28	0.00000	1.000	conc
138	o29	4.918830E-33	1.000	conc
139	o30	3.533770E-30	1.000	conc
140	o31	0.00000	1.000	conc
141	o32	0.00000	1.000	conc
142	o33	2.521790E-29	1.000	conc
143	o34	3.813090E-29	1.000	conc
144	o35	0.00000	1.000	conc
145	o36	0.00000	1.000	conc
146	o37	0.00000	1.000	conc

147	o38	0.00000	1.000	conc
148	o39	0.00000	1.000	conc
149	o40	2.530210E-28	1.000	conc
150	o41	9.860960E-28	1.000	conc
151	o42	0.00000	1.000	conc
152	o43	0.00000	1.000	conc
153	o44	9.379650E-27	1.000	conc
154	o45	4.815690E-27	1.000	conc
155	o46	0.00000	1.000	conc
156	o47	1.648990E-26	1.000	conc
157	o48	1.792110E-25	1.000	conc
158	o49	0.00000	1.000	conc
159	o50	0.00000	1.000	conc
160	o51	1.535060E-24	1.000	conc
161	o52	1.506930E-24	1.000	conc
162	o53	0.00000	1.000	conc
163	o54	0.00000	1.000	conc
164	o55	3.412410E-23	1.000	conc
165	o56	0.00000	1.000	conc
166	o57	0.00000	1.000	conc
167	o58	2.389050E-22	1.000	conc
168	o59	3.756800E-22	1.000	conc
169	o60	0.00000	1.000	conc
170	o61	0.00000	1.000	conc
171	o62	6.290950E-21	1.000	conc
172	o63	0.00000	1.000	conc
173	o64	0.00000	1.000	conc
174	o65	3.461990E-20	1.000	conc
175	o66	8.413140E-20	1.000	conc
176	o67	0.00000	1.000	conc
177	o68	0.00000	1.000	conc
178	o69	1.123570E-18	1.000	conc
179	o70	0.00000	1.000	conc
180	o71	0.00000	1.000	conc
181	o72	4.475000E-18	1.000	conc
182	o73	1.764230E-17	1.000	conc
183	o74	0.00000	1.000	conc
184	o75	0.00000	1.000	conc
185	o76	1.940590E-16	1.000	conc
186	o77	7.127540E-17	1.000	conc
187	o78	0.00000	1.000	conc
188	o79	4.578440E-16	1.000	conc
189	o80	3.529640E-15	1.000	conc
190	o81	0.00000	1.000	conc
191	o82	0.00000	1.000	conc
192	o83	5.591460E-15	1.000	conc
193	o84	5.097810E-14	1.000	conc
194	o85	0.00000	1.000	conc
195	o86	0.00000	1.000	conc
196	o87	4.356530E-13	1.000	conc
197	o88	4.052020E-13	1.000	conc
198	o89	0.00000	1.000	conc
199	o90	2.400000E-14	1.000	conc
200	o91	9.530250E-12	1.000	conc
201	o92	0.00000	1.000	conc
202	o93	0.00000	1.000	conc
203	o94	6.818530E-11	1.000	conc
204	o95	1.025520E-10	1.000	conc
205	o96	0.00000	1.000	conc
206	o97	0.00000	1.000	conc
207	o98	1.762580E-09	1.000	conc
208	o99	0.00000	1.000	conc
209	o100	0.00000	1.000	conc
210	o101	9.966190E-09	1.000	conc
211	o102	2.315860E-08	1.000	conc
212	o103	0.00000	1.000	conc
213	o104	0.00000	1.000	conc
214	o105	3.158230E-07	1.000	conc
215	o106	0.00000	1.000	conc
216	o107	0.00000	1.000	conc
217	o108	1.307490E-06	1.000	conc
218	o109	4.883490E-06	1.000	conc
219	o110	0.00000	1.000	conc

220	o111	0.00000	1.000	conc
221	o112	5.474160E-05	1.000	conc
222	o113	1.780180E-05	1.000	conc
223	o114	0.00000	1.000	conc
224	o115	1.385330E-04	1.000	conc
225	o116	9.811610E-04	1.000	conc
226	o117	0.00000	1.000	conc
227	o118	0.00000	1.000	conc
228	o119	9.139440E-03	1.000	conc
229	o120	6.972520E-03	1.000	conc
230	o121	0.00000	1.000	conc
231	o122	0.166320	1.000	conc
232	o123	0.00000	1.000	conc
233	o124	0.00000	1.000	conc
234	o125	0.776139	1.000	conc
235	o126	2.73776	1.000	conc
236	o127	0.00000	1.000	conc
237	o128	0.00000	1.000	conc
238	o129	31.3458	1.000	conc
239	o130	8.75085	1.000	conc
240	o131	0.00000	1.000	conc
241	o132	86.1408	1.000	conc
242	o133	963.476	1.000	conc
243	o134	1747.51	1.000	conc
244	o135	3591.21	1.000	conc
245	o136	9918.59	1.000	conc
246	o137	15848.6	1.000	conc
247	o138	15510.6	1.000	conc
248	o139	40579.2	1.000	conc
249	o140	107955.	1.000	conc
250	o141	130437.	1.000	conc
251	o142	87393.5	1.000	conc
252	o143	113899.	1.000	conc
253	o144	212482.	1.000	conc
254	o145	250810.	1.000	conc
255	o146	238335.	1.000	conc
256	o147	246662.	1.000	conc
257	o148	253421.	1.000	conc
258	o149	228386.	1.000	conc
259	o150	189898.	1.000	conc
260	o151	171060.	1.000	conc
261	o152	209249.	1.000	conc
262	o153	263462.	1.000	conc
263	o154	253026.	1.000	conc
264	o155	213009.	1.000	conc
265	o156	206588.	1.000	conc
266	o157	237117.	1.000	conc
267	o158	281729.	1.000	conc
268	o159	295557.	1.000	conc
269	o160	280600.	1.000	conc
270	o161	280690.	1.000	conc
271	o162	292713.	1.000	conc
272	o163	292851.	1.000	conc
273	o164	279875.	1.000	conc
274	o165	258901.	1.000	conc
275	o166	235046.	1.000	conc
276	o167	213428.	1.000	conc
277	o168	199164.	1.000	conc
278	o169	197371.	1.000	conc
279	o170	203306.	1.000	conc
280	o171	170565.	1.000	conc
281	o172	94276.1	1.000	conc
282	o173	82388.0	1.000	conc
283	o174	144291.	1.000	conc
284	o175	161528.	1.000	conc
285	o176	128019.	1.000	conc
286	o177	108437.	1.000	conc
287	o178	110262.	1.000	conc
288	o179	121310.	1.000	conc
289	o180	133760.	1.000	conc
290	o181	139392.	1.000	conc
291	o182	129247.	1.000	conc
292	o183	116109.	1.000	conc

293	o184	126217.	1.000	conc
294	o185	139498.	1.000	conc
295	o186	126431.	1.000	conc
296	o187	110561.	1.000	conc
297	o188	110899.	1.000	conc
298	o189	109252.	1.000	conc
299	o190	99126.8	1.000	conc
300	o191	92048.0	1.000	conc
301	o192	89688.8	1.000	conc
302	o193	88557.5	1.000	conc
303	o194	94958.0	1.000	conc
304	o195	107079.	1.000	conc
305	o196	91369.6	1.000	conc
306	o197	46576.9	1.000	conc
307	o198	25748.9	1.000	conc
308	o199	33799.4	1.000	conc
309	o200	35631.0	1.000	conc
310	o201	28383.7	1.000	conc
311	o202	23252.8	1.000	conc
312	o203	26145.9	1.000	conc
313	o204	36201.1	1.000	conc
314	o205	41993.2	1.000	conc
315	o206	42503.4	1.000	conc
316	o207	49159.4	1.000	conc
317	o208	59113.1	1.000	conc
318	o209	53550.1	1.000	conc
319	o210	42313.1	1.000	conc
320	o211	49127.3	1.000	conc
321	o212	59932.4	1.000	conc
322	o213	57765.5	1.000	conc
323	o214	59051.1	1.000	conc
324	o215	71289.7	1.000	conc
325	o216	78099.1	1.000	conc
326	o217	74866.7	1.000	conc
327	o218	69517.8	1.000	conc
328	o219	70436.8	1.000	conc
329	o220	82025.2	1.000	conc
330	o221	92322.6	1.000	conc
331	o222	93098.2	1.000	conc
332	o223	93041.5	1.000	conc
333	o224	100680.	1.000	conc
334	o225	120120.	1.000	conc
335	o226	135730.	1.000	conc
336	o227	127404.	1.000	conc
337	o228	121217.	1.000	conc
338	o229	136763.	1.000	conc
339	o230	129342.	1.000	conc
340	o231	88468.1	1.000	conc
341	o232	70850.2	1.000	conc
342	o233	80996.3	1.000	conc
343	o234	79578.4	1.000	conc
344	o235	71476.0	1.000	conc
345	o236	74543.8	1.000	conc
346	o237	73858.3	1.000	conc
347	o238	60598.7	1.000	conc
348	o239	54071.0	1.000	conc
349	o240	58191.7	1.000	conc
350	o241	57334.7	1.000	conc
351	o242	52277.3	1.000	conc
352	o243	52213.6	1.000	conc
353	o244	53457.5	1.000	conc
354	o245	51425.7	1.000	conc
355	o246	50764.7	1.000	conc
356	o247	52332.4	1.000	conc
357	o248	49494.8	1.000	conc
358	o249	41204.9	1.000	conc
359	o250	31483.7	1.000	conc
360	o251	24486.3	1.000	conc
361	o252	21590.2	1.000	conc
362	o253	18193.9	1.000	conc
363	o254	13790.9	1.000	conc
364	o255	13243.4	1.000	conc
365	o256	14937.6	1.000	conc

366	o257	13632.5	1.000	conc
367	o258	9520.91	1.000	conc
368	o259	5061.07	1.000	conc
369	o260	3493.82	1.000	conc
370	o261	5447.37	1.000	conc
371	o262	7290.70	1.000	conc
372	o263	7251.73	1.000	conc
373	o264	5666.69	1.000	conc
374	o265	4002.47	1.000	conc
375	o266	3705.62	1.000	conc
376	o267	4079.18	1.000	conc
377	o268	4342.79	1.000	conc
378	o269	4657.45	1.000	conc
379	o270	4709.12	1.000	conc
380	o271	3662.07	1.000	conc
381	o272	2533.16	1.000	conc
382	o273	2971.71	1.000	conc
383	o274	3480.80	1.000	conc
384	o275	2837.98	1.000	conc
385	o276	3585.37	1.000	conc
386	o277	5772.33	1.000	conc
387	o278	5009.78	1.000	conc
388	o279	2281.37	1.000	conc
389	o280	2563.73	1.000	conc
390	o281	4521.34	1.000	conc
391	o282	4986.85	1.000	conc
392	o283	5110.52	1.000	conc
393	o284	6018.91	1.000	conc
394	o285	6769.64	1.000	conc
395	o286	7514.82	1.000	conc
396	o287	9606.69	1.000	conc
397	o288	11461.7	1.000	conc
398	o289	10743.1	1.000	conc
399	o290	10720.9	1.000	conc
400	o291	13733.1	1.000	conc
401	o292	14813.8	1.000	conc
402	o293	11710.4	1.000	conc
403	o294	7841.36	1.000	conc
404	o295	6105.19	1.000	conc
405	o296	6112.11	1.000	conc
406	o297	6769.24	1.000	conc
407	o298	7018.63	1.000	conc
408	o299	6603.01	1.000	conc
409	o300	6064.89	1.000	conc
410	o301	5981.44	1.000	conc
411	o302	6769.91	1.000	conc
412	o303	8101.42	1.000	conc
413	o304	9429.78	1.000	conc
414	o305	10216.6	1.000	conc
415	o306	10232.1	1.000	conc
416	o307	9650.45	1.000	conc
417	o308	8673.18	1.000	conc
418	o309	7502.49	1.000	conc
419	o310	6345.57	1.000	conc
420	o311	5411.55	1.000	conc
421	o312	4907.69	1.000	conc
422	o313	4888.55	1.000	conc
423	o314	5145.72	1.000	conc
424	o315	5444.77	1.000	conc
425	o316	5566.72	1.000	conc
426	o317	5430.42	1.000	conc
427	o318	5027.17	1.000	conc
428	o319	4349.18	1.000	conc
429	o320	3446.13	1.000	conc
430	o321	2499.34	1.000	conc
431	o322	1708.47	1.000	conc
432	o323	1259.21	1.000	conc
433	o324	1157.75	1.000	conc
434	o325	1285.64	1.000	conc
435	o326	1521.98	1.000	conc
436	o327	1760.85	1.000	conc
437	o328	1942.61	1.000	conc
438	o329	2016.51	1.000	conc

439	o330	1934.51	1.000	conc
440	o331	1702.19	1.000	conc
441	o332	1373.90	1.000	conc
442	o333	1005.74	1.000	conc
443	o334	649.533	1.000	conc
444	o335	339.055	1.000	conc
445	o336	103.355	1.000	conc
446	o337	0.00000	1.000	conc
447	o338	0.00000	1.000	conc
448	o339	0.00000	1.000	conc
449	o340	0.00000	1.000	conc
450	o341	0.00000	1.000	conc
451	o342	0.00000	1.000	conc
452	o343	0.00000	1.000	conc
453	o344	24.6039	1.000	conc
454	o345	189.070	1.000	conc
455	o346	371.669	1.000	conc
456	o347	489.454	1.000	conc
457	o348	467.298	1.000	conc
458	o349	323.288	1.000	conc
459	o350	136.783	1.000	conc
460	o351	0.00000	1.000	conc
461	o352	0.00000	1.000	conc
462	o353	0.00000	1.000	conc
463	o354	0.00000	1.000	conc
464	o355	15.9872	1.000	conc
465	o356	27.6263	1.000	conc
466	o357	20.8621	1.000	conc
467	o358	0.00000	1.000	conc
468	o359	0.00000	1.000	conc
469	o360	0.00000	1.000	conc
470	o361	0.00000	1.000	conc
471	o362	38.6360	1.000	conc
472	o363	161.098	1.000	conc
473	o364	316.812	1.000	conc
474	o365	483.800	1.000	conc
475	o366	642.739	1.000	conc
476	o367	788.596	1.000	conc
477	o368	921.125	1.000	conc
478	o369	1039.77	1.000	conc
479	o370	1127.28	1.000	conc
480	o371	1141.63	1.000	conc
481	o372	1038.82	1.000	conc
482	o373	787.834	1.000	conc
483	o374	454.309	1.000	conc
484	o375	147.371	1.000	conc
485	o376	0.00000	1.000	conc
486	o377	0.00000	1.000	conc
487	o378	178.614	1.000	conc
488	o379	464.396	1.000	conc
489	o380	806.740	1.000	conc
490	o381	1155.84	1.000	conc
491	o382	1461.89	1.000	conc
492	o383	1676.50	1.000	conc
493	o384	1760.11	1.000	conc
494	o385	1676.55	1.000	conc
495	o386	1390.50	1.000	conc
496	o387	931.442	1.000	conc
497	o388	437.972	1.000	conc
498	o389	59.1618	1.000	conc
499	o390	0.00000	1.000	conc
500	o391	26.7570	1.000	conc
501	o392	267.289	1.000	conc
502	o393	557.398	1.000	conc
503	o394	817.031	1.000	conc
504	o395	991.351	1.000	conc
505	o396	1028.94	1.000	conc
506	o397	885.073	1.000	conc
507	o398	598.276	1.000	conc
508	o399	263.623	1.000	conc
509	o400	0.00000	1.000	conc
510	o401	0.00000	1.000	conc
511	o402	0.00000	1.000	conc

512	o403	0.00000	1.000	conc
513	o404	152.637	1.000	conc
514	o405	486.728	1.000	conc
515	o406	803.196	1.000	conc
516	o407	999.271	1.000	conc
517	o408	1001.11	1.000	conc
518	o409	853.094	1.000	conc
519	o410	629.831	1.000	conc
520	o411	404.922	1.000	conc
521	o412	221.358	1.000	conc
522	o413	86.4305	1.000	conc
523	o414	5.41412	1.000	conc
524	o415	0.00000	1.000	conc
525	o416	0.00000	1.000	conc
526	o417	1.83637	1.000	conc
527	o418	0.00000	1.000	conc
528	o419	20.0022	1.000	conc
529	o420	167.357	1.000	conc
530	o421	356.022	1.000	conc
531	o422	487.104	1.000	conc
532	o423	472.761	1.000	conc
533	o424	331.322	1.000	conc
534	o425	140.303	1.000	conc
535	o426	0.00000	1.000	conc
536	o427	0.00000	1.000	conc
537	o428	0.00000	1.000	conc
538	o429	0.00000	1.000	conc
539	o430	77.2770	1.000	conc
540	o431	224.980	1.000	conc
541	o432	377.267	1.000	conc
542	o433	507.381	1.000	conc
543	o434	591.128	1.000	conc
544	o435	612.737	1.000	conc
545	o436	558.166	1.000	conc
546	o437	415.570	1.000	conc
547	o438	220.447	1.000	conc
548	o439	53.8837	1.000	conc
549	o440	0.00000	1.000	conc
550	o441	108.455	1.000	conc
551	o442	303.139	1.000	conc
552	o443	466.067	1.000	conc
553	o444	483.141	1.000	conc
554	o445	338.699	1.000	conc
555	o446	141.219	1.000	conc
556	o447	7.10519	1.000	conc
557	o448	31.8670	1.000	conc
558	o449	183.043	1.000	conc
559	o450	379.758	1.000	conc
560	o451	541.471	1.000	conc
561	o452	618.586	1.000	conc
562	o453	612.838	1.000	conc
563	o454	530.791	1.000	conc
564	o455	382.484	1.000	conc
565	o456	207.541	1.000	conc
566	o457	60.5508	1.000	conc
567	o458	0.00000	1.000	conc
568	o459	46.1642	1.000	conc
569	o460	192.871	1.000	conc
570	o461	411.737	1.000	conc
571	o462	675.194	1.000	conc
572	o463	918.134	1.000	conc
573	o464	1050.34	1.000	conc
574	o465	981.197	1.000	conc
575	o466	681.595	1.000	conc
576	o467	304.360	1.000	conc
577	o468	35.7788	1.000	conc
578	o469	51.8214	1.000	conc
579	o470	338.819	1.000	conc
580	o471	716.697	1.000	conc
581	o472	999.732	1.000	conc
582	o473	1047.59	1.000	conc
583	o474	902.303	1.000	conc
584	o475	651.723	1.000	conc

585	o476	382.911	1.000	conc
586	o477	159.502	1.000	conc
587	o478	18.2148	1.000	conc
588	o479	0.00000	1.000	conc
589	o480	107.393	1.000	conc
590	o481	291.838	1.000	conc
591	o482	452.788	1.000	conc
592	o483	496.542	1.000	conc
593	o484	393.985	1.000	conc
594	o485	213.383	1.000	conc
595	o486	31.0702	1.000	conc
596	o487	0.00000	1.000	conc
597	o488	0.00000	1.000	conc
598	o489	0.00000	1.000	conc
599	o490	30.4946	1.000	conc
600	o491	180.699	1.000	conc
601	o492	340.231	1.000	conc
602	o493	471.098	1.000	conc
603	o494	538.884	1.000	conc
604	o495	547.549	1.000	conc
605	o496	524.384	1.000	conc
606	o497	496.995	1.000	conc
607	o498	484.919	1.000	conc
608	o499	486.180	1.000	conc
609	o500	495.254	1.000	conc

610
611

612 Control settings:-

613

614	Initial lambda	: 10.000
615	Lambda adjustment factor	: 2.0000
616	Sufficient new/old phi ratio per optimisation iteration	: 0.30000
617	Limiting relative phi reduction between lambdas	: 1.00000E-02
618	Maximum trial lambdas per iteration	: 8
619	Forgive model run failure during lamda testing	: yes
620	Forgive model run failure during Jacobian runs	: yes
621		
622	Perform Broyden's update of Jacobian matrix	: no
623	Undertake observation re-referencing	: no
624		
625	Maximum factor parameter change (factor-limited changes)	: 10.000
626	Maximum relative parameter change (relative-limited changes)	: na
627	Fraction of initial parameter values used in computing	
628	change limit for near-zero parameters	: 1.00000E-03
629	Allow bending of parameter upgrade vector	: no
630	Allow parameters to stick to their bounds	: no
631		
632	Relative phi reduction below which to begin use of	
633	central derivatives	: 0.10000
634	Iteration at which to first consider derivatives switch	: 1
635		
636	Relative phi reduction indicating convergence	: 0.50000E-02
637	Number of phi values required within this range	: 4
638	Maximum number of consecutive failures to lower phi	: 4
639	Minimal relative parameter change indicating convergence	: 0.50000E-02
640	Number of consecutive iterations with minimal param change	: 4
641	Maximum number of optimisation iterations	: 200
642		
643	Attempt automatic user intervention	: no
644		
645	Attempt reuse of parameter sensitivities	: no
646		
647	Scale parameters by their bounds	: yes

648
649

650 File saving options: -

651

652	Save best JCO file	: yes
653	Save multiple JCO files	: no
654	Save multiple REI files	: no
655	Save multiple PAR files	: yes

656
657

OPTIMISATION RECORD

INITIAL CONDITIONS:

Sum of squared weighted residuals (ie phi) = 1.02166E+11

Current parameter values

h1	80.0000
s1	2500.00
p1	0.850000
o1	3.300000E-04
h2	130.000
s2	750.000
p2	0.780000
o2	1.600000E-05
h3	170.000
s3	800.000
p3	0.300000
o3	3.500000E-05

OPTIMISATION ITERATION NO. : 1

Model calls so far : 1

Derivative model calls so far : 0

Starting phi for this iteration: 1.02166E+11

Lambda = 10.000 ----->

Phi = 8.52511E+10 (0.834 of starting phi)

Lambda = 5.0000 ----->

Phi = 8.52511E+10 (0.834 of starting phi)

No more lambdas: relative phi reduction between lambdas less than 0.0100

Lowest phi this iteration: 8.52511E+10

Current parameter values

h1	80.5239
s1	5000.00
p1	0.852430
o1	3.556670E-04
h2	129.535
s2	710.842
p2	0.800274
o2	1.532551E-05
h3	167.684
s3	782.079
p3	0.299536
o3	3.762602E-05

Previous parameter values

h1	80.0000
s1	2500.00
p1	0.850000
o1	3.300000E-04
h2	130.000
s2	750.000
p2	0.780000
o2	1.600000E-05
h3	170.000
s3	800.000
p3	0.300000
o3	3.500000E-05

Maximum factor change: 2.000 ["s1"]

Maximum relative change: 1.000 ["s1"]

OPTIMISATION ITERATION NO. : 2

Model calls so far : 9

Derivative model calls so far : 1

Starting phi for this iteration: 8.52511E+10

param "s1" frozen: gradient and update vectors out of bounds

Lambda = 5.0000 ----->

Phi = 8.46248E+10 (0.993 of starting phi)

Lambda = 2.5000 ----->

Phi = 8.46248E+10 (0.993 of starting phi)

No more lambdas: relative phi reduction between lambdas less than 0.0100

Lowest phi this iteration: 8.46248E+10

Relative phi reduction between optimisation iterations less than 0.1000

Switch to higher order derivatives calculation

Current parameter values

h1	80.8050
s1	5000.00
p1	0.855389

Previous parameter values

h1	80.5239
s1	5000.00
p1	0.852430

```

731      o1      3.357590E-04      o1      3.556670E-04
732      h2      129.564      h2      129.535
733      s2      737.552      s2      710.842
734      p2      0.777974      p2      0.800274
735      o2      1.624590E-05      o2      1.532551E-05
736      h3      167.733      h3      167.684
737      s3      806.636      s3      782.079
738      p3      0.299353      p3      0.299536
739      o3      3.474980E-05      o3      3.762602E-05
740      Maximum factor change: 1.083      ["o3"]
741      Maximum relative change: 7.6442E-02      ["o3"]
742
743
744      OPTIMISATION ITERATION NO.      : 3
745      Model calls so far      : 17
746      Derivative model calls so far      : 2
747      Starting phi for this iteration: 8.46248E+10
748      All frozen parameters freed.
749
750      Lambda = 2.5000      ----->
751      Phi = 8.46678E+10      ( 1.001 times starting phi)
752
753      Lambda = 1.2500      ----->
754      Phi = 8.46678E+10      ( 1.001 times starting phi)
755
756      No more lambdas: relative phi reduction between lambdas less than 0.0100
757      Lowest phi this iteration: 8.46678E+10
758
759      Current parameter values      Previous parameter values
760      h1      80.9645      h1      80.8050
761      s1      4675.20      s1      5000.00
762      p1      0.856556      p1      0.855389
763      o1      3.258279E-04      o1      3.357590E-04
764      h2      129.573      h2      129.564
765      s2      743.722      s2      737.552
766      p2      0.764592      p2      0.777974
767      o2      1.670360E-05      o2      1.624590E-05
768      h3      167.726      h3      167.733
769      s3      805.880      s3      806.636
770      p3      0.299232      p3      0.299353
771      o3      3.459782E-05      o3      3.474980E-05
772      Maximum factor change: 1.069      ["s1"]
773      Maximum relative change: 6.4960E-02      ["s1"]
774
775
776      OPTIMISATION ITERATION NO.      : 4
777      Model calls so far      : 31
778      Derivative model calls so far      : 3
779      Starting phi for this iteration: 8.46678E+10
780
781      Lambda = 1.2500      ----->
782      Phi = 8.46335E+10      ( 1.000 of starting phi)
783
784      Lambda = 0.62500      ----->
785      Phi = 8.46335E+10      ( 1.000 of starting phi)
786
787      No more lambdas: relative phi reduction between lambdas less than 0.0100
788      Lowest phi this iteration: 8.46335E+10
789
790      Current parameter values      Previous parameter values
791      h1      80.9315      h1      80.9645
792      s1      4834.87      s1      4675.20
793      p1      0.856226      p1      0.856556
794      o1      3.276094E-04      o1      3.258279E-04
795      h2      129.570      h2      129.573
796      s2      743.251      s2      743.722
797      p2      0.764466      p2      0.764592
798      o2      1.664407E-05      o2      1.670360E-05
799      h3      167.726      h3      167.726
800      s3      804.159      s3      805.880
801      p3      0.299229      p3      0.299232
802      o3      3.444588E-05      o3      3.459782E-05
803      Maximum factor change: 1.034      ["s1"]

```

```

804 Maximum relative change: 3.4153E-02 ["s1"]
805
806
807 OPTIMISATION ITERATION NO. : 5
808 Model calls so far : 45
809 Derivative model calls so far : 4
810 Starting phi for this iteration: 8.46335E+10
811
812 Lambda = 0.62500 ----->
813 Phi = 8.46235E+10 ( 1.000 of starting phi)
814
815 Lambda = 0.31250 ----->
816 Phi = 8.46235E+10 ( 1.000 of starting phi)
817
818 No more lambdas: relative phi reduction between lambdas less than 0.0100
819 Lowest phi this iteration: 8.46235E+10
820
821 Current parameter values Previous parameter values
822 h1 80.9145 h1 80.9315
823 s1 4974.34 s1 4834.87
824 p1 0.856013 p1 0.856226
825 o1 3.285186E-04 o1 3.276094E-04
826 h2 129.568 h2 129.570
827 s2 743.390 s2 743.251
828 p2 0.761307 p2 0.764466
829 o2 1.663139E-05 o2 1.664407E-05
830 h3 167.725 h3 167.726
831 s3 799.611 s3 804.159
832 p3 0.299194 p3 0.299229
833 o3 3.407141E-05 o3 3.444588E-05
834 Maximum factor change: 1.029 ["s1"]
835 Maximum relative change: 2.8846E-02 ["s1"]
836
837 Optimisation complete: the 4 lowest phi's are within a relative distance
838 of eachother of 5.000E-03
839 Total model calls: 59
840
841 The model has been run one final time using best parameters.
842 Thus all model input files contain best parameter values, and model
843 output files contain model results based on these parameters.
844
845
846 OPTIMISATION RESULTS
847
848 Covariance matrix and parameter confidence intervals cannot be determined:-
849 Memory conservation is operative so that covariance matrix is not calculated.
850
851
852 Parameters ----->
853
854 Parameter Estimated value
855 h1 80.9145
856 s1 4974.34
857 p1 0.856013
858 o1 3.285186E-04
859 h2 129.568
860 s2 743.390
861 p2 0.761307
862 o2 1.663139E-05
863 h3 167.725
864 s3 799.611
865 p3 0.299194
866 o3 3.407141E-05
867
868 See file mfit.sen for parameter sensitivities.
869
870
871 Observations ----->
872
873 Observation Measured Calculated Residual Weight Group
874 value value
875 o1 1.762070E-39 0.00000 1.762070E-39 1.000
876 conc

```

876	o2	2.325900E-39	0.00000	2.325900E-39	1.000
	conc				
877	o3	0.00000	0.00000	0.00000	1.000
	conc				
878	o4	0.00000	0.00000	0.00000	1.000
	conc				
879	o5	3.238130E-38	0.00000	3.238130E-38	1.000
	conc				
880	o6	0.00000	0.00000	0.00000	1.000
	conc				
881	o7	0.00000	0.00000	0.00000	1.000
	conc				
882	o8	1.655480E-37	0.00000	1.655480E-37	1.000
	conc				
883	o9	4.515590E-37	0.00000	4.515590E-37	1.000
	conc				
884	o10	0.00000	0.00000	0.00000	1.000
	conc				
885	o11	0.00000	0.00000	0.00000	1.000
	conc				
886	o12	5.727360E-36	0.00000	5.727360E-36	1.000
	conc				
887	o13	3.627010E-37	0.00000	3.627010E-37	1.000
	conc				
888	o14	0.00000	0.00000	0.00000	1.000
	conc				
889	o15	2.050830E-35	0.00000	2.050830E-35	1.000
	conc				
890	o16	9.343950E-35	0.00000	9.343950E-35	1.000
	conc				
891	o17	0.00000	0.00000	0.00000	1.000
	conc				
892	o18	0.00000	0.00000	0.00000	1.000
	conc				
893	o19	9.801770E-34	0.00000	9.801770E-34	1.000
	conc				
894	o20	4.660000E-34	0.00000	4.660000E-34	1.000
	conc				
895	o21	0.00000	0.00000	0.00000	1.000
	conc				
896	o22	1.878980E-33	0.00000	1.878980E-33	1.000
	conc				
897	o23	1.850280E-32	0.00000	1.850280E-32	1.000
	conc				
898	o24	0.00000	0.00000	0.00000	1.000
	conc				
899	o25	0.00000	0.00000	0.00000	1.000
	conc				
900	o26	1.611970E-31	0.00000	1.611970E-31	1.000
	conc				
901	o27	1.509350E-31	0.00000	1.509350E-31	1.000
	conc				
902	o28	0.00000	0.00000	0.00000	1.000
	conc				
903	o29	4.918830E-33	0.00000	4.918830E-33	1.000
	conc				
904	o30	3.533770E-30	0.00000	3.533770E-30	1.000
	conc				
905	o31	0.00000	0.00000	0.00000	1.000
	conc				
906	o32	0.00000	0.00000	0.00000	1.000
	conc				
907	o33	2.521790E-29	0.00000	2.521790E-29	1.000
	conc				
908	o34	3.813090E-29	0.00000	3.813090E-29	1.000
	conc				
909	o35	0.00000	0.00000	0.00000	1.000
	conc				
910	o36	0.00000	0.00000	0.00000	1.000
	conc				
911	o37	0.00000	0.00000	0.00000	1.000
	conc				
912	o38	0.00000	0.00000	0.00000	1.000

913	conc o39	0.00000	6.035659-314	-6.035659-314	1.000
914	conc o40	2.530210E-28	7.305196-303	2.530210E-28	1.000
915	conc o41	9.860960E-28	2.504729-292	9.860960E-28	1.000
916	conc o42	0.00000	2.657874-282	-2.657874-282	1.000
917	conc o43	0.00000	9.459494-273	-9.459494-273	1.000
918	conc o44	9.379650E-27	1.214945-263	9.379650E-27	1.000
919	conc o45	4.815690E-27	6.020295-255	4.815690E-27	1.000
920	conc o46	0.00000	1.223449-246	-1.223449-246	1.000
921	conc o47	1.648990E-26	1.078387-238	1.648990E-26	1.000
922	conc o48	1.792110E-25	4.340129-231	1.792110E-25	1.000
923	conc o49	0.00000	8.361718-224	-8.361718-224	1.000
924	conc o50	0.00000	8.054920-217	-8.054920-217	1.000
925	conc o51	1.535060E-24	4.038750-210	1.535060E-24	1.000
926	conc o52	1.506930E-24	1.093899-203	1.506930E-24	1.000
927	conc o53	0.00000	1.656445-197	-1.656445-197	1.000
928	conc o54	0.00000	1.447710-191	-1.447710-191	1.000
929	conc o55	3.412410E-23	7.521997-186	3.412410E-23	1.000
930	conc o56	0.00000	2.388194-180	-2.388194-180	1.000
931	conc o57	0.00000	4.753374-175	-4.753374-175	1.000
932	conc o58	2.389050E-22	6.074144-170	2.389050E-22	1.000
933	conc o59	3.756800E-22	5.095428-165	3.756800E-22	1.000
934	conc o60	0.00000	2.864933-160	-2.864933-160	1.000
935	conc o61	0.00000	1.100849-155	-1.100849-155	1.000
936	conc o62	6.290950E-21	2.943906-151	6.290950E-21	1.000
937	conc o63	0.00000	5.573274-147	-5.573274-147	1.000
938	conc o64	0.00000	7.589918-143	-7.589918-143	1.000
939	conc o65	3.461990E-20	7.547990-139	3.461990E-20	1.000
940	conc o66	8.413140E-20	5.559419-135	8.413140E-20	1.000
941	conc o67	0.00000	3.073301-131	-3.073301-131	1.000
942	conc o68	0.00000	1.291210-127	-1.291210-127	1.000
943	conc o69	1.123570E-18	4.171870-124	1.123570E-18	1.000
944	conc o70	0.00000	1.048198-120	-1.048198-120	1.000
945	conc o71	0.00000	2.069672-117	-2.069672-117	1.000
946	conc o72	4.475000E-18	3.243555-114	4.475000E-18	1.000
947	conc o73	1.764230E-17	4.072719-111	1.764230E-17	1.000
948	conc o74	0.00000	4.133847-108	-4.133847-108	1.000

949	o75 conc	0.00000	3.420508-105	-3.420508-105	1.000
950	o76 conc	1.940590E-16	2.325743-102	1.940590E-16	1.000
951	o77 conc	7.127540E-17	1.309358E-99	7.127540E-17	1.000
952	o78 conc	0.00000	6.147568E-97	-6.147568E-97	1.000
953	o79 conc	4.578440E-16	2.423614E-94	4.578440E-16	1.000
954	o80 conc	3.529640E-15	8.075294E-92	3.529640E-15	1.000
955	o81 conc	0.00000	2.288072E-89	-2.288072E-89	1.000
956	o82 conc	0.00000	5.545611E-87	-5.545611E-87	1.000
957	o83 conc	5.591460E-15	1.156186E-84	5.591460E-15	1.000
958	o84 conc	5.097810E-14	2.084589E-82	5.097810E-14	1.000
959	o85 conc	0.00000	3.266892E-80	-3.266892E-80	1.000
960	o86 conc	0.00000	4.471739E-78	-4.471739E-78	1.000
961	o87 conc	4.356530E-13	5.371000E-76	4.356530E-13	1.000
962	o88 conc	4.052020E-13	5.685782E-74	4.052020E-13	1.000
963	o89 conc	0.00000	5.327397E-72	-5.327397E-72	1.000
964	o90 conc	2.400000E-14	4.435909E-70	2.400000E-14	1.000
965	o91 conc	9.530250E-12	3.295105E-68	9.530250E-12	1.000
966	o92 conc	0.00000	2.191690E-66	-2.191690E-66	1.000
967	o93 conc	0.00000	1.309929E-64	-1.309929E-64	1.000
968	o94 conc	6.818530E-11	7.059044E-63	6.818530E-11	1.000
969	o95 conc	1.025520E-10	3.440988E-61	1.025520E-10	1.000
970	o96 conc	0.00000	1.521986E-59	-1.521986E-59	1.000
971	o97 conc	0.00000	6.126662E-58	-6.126662E-58	1.000
972	o98 conc	1.762580E-09	2.250954E-56	1.762580E-09	1.000
973	o99 conc	0.00000	7.568886E-55	-7.568886E-55	1.000
974	o100 conc	0.00000	2.335426E-53	-2.335426E-53	1.000
975	o101 conc	9.966190E-09	6.629340E-52	9.966190E-09	1.000
976	o102 conc	2.315860E-08	1.735413E-50	2.315860E-08	1.000
977	o103 conc	0.00000	4.199768E-49	-4.199768E-49	1.000
978	o104 conc	0.00000	9.515132E-48	-9.515132E-48	1.000
979	o105 conc	3.158230E-07	3.666833E-46	3.158230E-07	1.000
980	o106 conc	0.00000	2.172860E-43	-2.172860E-43	1.000
981	o107 conc	0.00000	1.991626E-40	-1.991626E-40	1.000
982	o108 conc	1.307490E-06	1.395963E-37	1.307490E-06	1.000
983	o109 conc	4.883490E-06	7.416672E-35	4.883490E-06	1.000
984	o110 conc	0.00000	3.008470E-32	-3.008470E-32	1.000
985	o111	0.00000	9.385026E-30	-9.385026E-30	1.000

986	conc o112	5.474160E-05	2.267373E-27	5.474160E-05	1.000
987	conc o113	1.780180E-05	4.271168E-25	1.780180E-05	1.000
988	conc o114	0.00000	6.314578E-23	-6.314578E-23	1.000
989	conc o115	1.385330E-04	7.373218E-21	1.385330E-04	1.000
990	conc o116	9.811610E-04	6.841230E-19	9.811610E-04	1.000
991	conc o117	0.00000	5.073846E-17	-5.073846E-17	1.000
992	conc o118	0.00000	3.025131E-15	-3.025131E-15	1.000
993	conc o119	9.139440E-03	1.457985E-13	9.139440E-03	1.000
994	conc o120	6.972520E-03	5.710664E-12	6.972520E-03	1.000
995	conc o121	0.00000	1.827237E-10	-1.827237E-10	1.000
996	conc o122	0.166320	4.800216E-09	0.166320	1.000
997	conc o123	0.00000	1.040404E-07	-1.040404E-07	1.000
998	conc o124	0.00000	1.869291E-06	-1.869291E-06	1.000
999	conc o125	0.776139	2.796963E-05	0.776111	1.000
1000	conc o126	2.73776	3.500918E-04	2.73741	1.000
1001	conc o127	0.00000	3.681848E-03	-3.681848E-03	1.000
1002	conc o128	0.00000	3.267388E-02	-3.267388E-02	1.000
1003	conc o129	31.3458	0.245705	31.1001	1.000
1004	conc o130	8.75085	1.57220	7.17865	1.000
1005	conc o131	0.00000	8.59533	-8.59533	1.000
1006	conc o132	86.1408	40.3144	45.8264	1.000
1007	conc o133	963.476	162.888	800.588	1.000
1008	conc o134	1747.51	569.344	1178.17	1.000
1009	conc o135	3591.21	1729.02	1862.19	1.000
1010	conc o136	9918.59	4583.00	5335.59	1.000
1011	conc o137	15848.6	10655.4	5193.20	1.000
1012	conc o138	15510.6	21849.1	-6338.54	1.000
1013	conc o139	40579.2	39760.4	818.777	1.000
1014	conc o140	107955.	64683.6	43271.4	1.000
1015	conc o141	130437.	94899.5	35537.5	1.000
1016	conc o142	87393.5	126898.	-39504.6	1.000
1017	conc o143	113899.	156630.	-42731.4	1.000
1018	conc o144	212482.	181097.	31384.9	1.000
1019	conc o145	250810.	199296.	51513.7	1.000
1020	conc o146	238335.	212057.	26277.8	1.000
1021	conc o147	246662.	221096.	25566.5	1.000
	conc				

1022	o148 conc	253421.	228026.	25395.4	1.000
1023	o149 conc	228386.	233845.	-5458.91	1.000
1024	o150 conc	189898.	238929.	-49031.5	1.000
1025	o151 conc	171060.	243285.	-72225.3	1.000
1026	o152 conc	209249.	246799.	-37550.3	1.000
1027	o153 conc	263462.	249380.	14082.2	1.000
1028	o154 conc	253026.	250996.	2030.04	1.000
1029	o155 conc	213009.	251668.	-38658.8	1.000
1030	o156 conc	206588.	251445.	-44857.2	1.000
1031	o157 conc	237117.	250392.	-13274.6	1.000
1032	o158 conc	281729.	248575.	33154.0	1.000
1033	o159 conc	295557.	246064.	49493.0	1.000
1034	o160 conc	280600.	242926.	37673.9	1.000
1035	o161 conc	280690.	239226.	41463.7	1.000
1036	o162 conc	292713.	235028.	57685.3	1.000
1037	o163 conc	292851.	230390.	62460.9	1.000
1038	o164 conc	279875.	225371.	54504.2	1.000
1039	o165 conc	258901.	220024.	38877.4	1.000
1040	o166 conc	235046.	214400.	20646.4	1.000
1041	o167 conc	213428.	208546.	4881.77	1.000
1042	o168 conc	199164.	202508.	-3344.04	1.000
1043	o169 conc	197371.	196326.	1044.77	1.000
1044	o170 conc	203306.	190039.	13267.1	1.000
1045	o171 conc	170565.	183681.	-13116.1	1.000
1046	o172 conc	94276.1	177285.	-83008.8	1.000
1047	o173 conc	82388.0	170879.	-88491.4	1.000
1048	o174 conc	144291.	164491.	-20200.1	1.000
1049	o175 conc	161528.	158144.	3384.35	1.000
1050	o176 conc	128019.	151858.	-23839.4	1.000
1051	o177 conc	108437.	145654.	-37217.3	1.000
1052	o178 conc	110262.	139548.	-29286.0	1.000
1053	o179 conc	121310.	133554.	-12244.2	1.000
1054	o180 conc	133760.	127685.	6074.57	1.000
1055	o181 conc	139392.	121953.	17439.2	1.000
1056	o182 conc	129247.	116366.	12881.4	1.000
1057	o183 conc	116109.	110932.	5177.12	1.000
1058	o184	126217.	105658.	20558.7	1.000

1059	conc o185	139498.	100550.	38947.5	1.000
1060	conc o186	126431.	95613.4	30817.6	1.000
1061	conc o187	110561.	90851.3	19709.7	1.000
1062	conc o188	110899.	86268.3	24630.7	1.000
1063	conc o189	109252.	81868.0	27384.0	1.000
1064	conc o190	99126.8	77654.8	21472.0	1.000
1065	conc o191	92048.0	73633.4	18414.6	1.000
1066	conc o192	89688.8	69809.3	19879.5	1.000
1067	conc o193	88557.5	66189.3	22368.2	1.000
1068	conc o194	94958.0	62781.8	32176.2	1.000
1069	conc o195	107079.	59597.0	47482.0	1.000
1070	conc o196	91369.6	56647.1	34722.5	1.000
1071	conc o197	46576.9	53946.5	-7369.56	1.000
1072	conc o198	25748.9	51511.9	-25763.0	1.000
1073	conc o199	33799.4	49362.4	-15563.0	1.000
1074	conc o200	35631.0	47519.0	-11888.0	1.000
1075	conc o201	28383.7	46004.2	-17620.5	1.000
1076	conc o202	23252.8	44841.7	-21588.9	1.000
1077	conc o203	26145.9	44055.3	-17909.4	1.000
1078	conc o204	36201.1	43668.2	-7467.12	1.000
1079	conc o205	41993.2	43701.6	-1708.43	1.000
1080	conc o206	42503.4	44173.6	-1670.19	1.000
1081	conc o207	49159.4	45097.5	4061.86	1.000
1082	conc o208	59113.1	46480.9	12632.2	1.000
1083	conc o209	53550.1	48323.7	5226.42	1.000
1084	conc o210	42313.1	50617.2	-8304.11	1.000
1085	conc o211	49127.3	53343.1	-4215.77	1.000
1086	conc o212	59932.4	56472.3	3460.11	1.000
1087	conc o213	57765.5	59964.9	-2199.44	1.000
1088	conc o214	59051.1	63770.1	-4718.98	1.000
1089	conc o215	71289.7	67826.2	3463.47	1.000
1090	conc o216	78099.1	72062.3	6036.84	1.000
1091	conc o217	74866.7	76398.8	-1532.08	1.000
1092	conc o218	69517.8	80749.9	-11232.1	1.000
1093	conc o219	70436.8	85025.6	-14588.8	1.000
1094	conc o220	82025.2	89133.7	-7108.51	1.000
	conc				

1095	o221 conc	92322.6	92983.2	-660.646	1.000
1096	o222 conc	93098.2	96486.6	-3388.37	1.000
1097	o223 conc	93041.5	99562.3	-6520.77	1.000
1098	o224 conc	100680.	102138.	-1457.67	1.000
1099	o225 conc	120120.	104151.	15969.1	1.000
1100	o226 conc	135730.	105553.	30177.0	1.000
1101	o227 conc	127404.	106309.	21095.2	1.000
1102	o228 conc	121217.	106398.	14818.8	1.000
1103	o229 conc	136763.	105816.	30946.6	1.000
1104	o230 conc	129342.	104573.	24768.6	1.000
1105	o231 conc	88468.1	102694.	-14225.4	1.000
1106	o232 conc	70850.2	100214.	-29364.0	1.000
1107	o233 conc	80996.3	97184.2	-16187.9	1.000
1108	o234 conc	79578.4	93661.8	-14083.4	1.000
1109	o235 conc	71476.0	89712.8	-18236.8	1.000
1110	o236 conc	74543.8	85408.2	-10864.4	1.000
1111	o237 conc	73858.3	80821.7	-6963.44	1.000
1112	o238 conc	60598.7	76028.3	-15429.6	1.000
1113	o239 conc	54071.0	71101.3	-17030.3	1.000
1114	o240 conc	58191.7	66111.2	-7919.53	1.000
1115	o241 conc	57334.7	61124.0	-3789.34	1.000
1116	o242 conc	52277.3	56199.9	-3922.55	1.000
1117	o243 conc	52213.6	51392.1	821.543	1.000
1118	o244 conc	53457.5	46746.7	6710.81	1.000
1119	o245 conc	51425.7	42302.1	9123.59	1.000
1120	o246 conc	50764.7	38089.0	12675.7	1.000
1121	o247 conc	52332.4	34130.3	18202.1	1.000
1122	o248 conc	49494.8	30442.1	19052.7	1.000
1123	o249 conc	41204.9	27033.6	14171.3	1.000
1124	o250 conc	31483.7	23908.4	7575.33	1.000
1125	o251 conc	24486.3	21064.6	3421.69	1.000
1126	o252 conc	21590.2	18496.2	3093.97	1.000
1127	o253 conc	18193.9	16193.6	2000.32	1.000
1128	o254 conc	13790.9	14144.2	-353.305	1.000
1129	o255 conc	13243.4	12333.6	909.761	1.000
1130	o256 conc	14937.6	10746.0	4191.56	1.000
1131	o257	13632.5	9364.79	4267.71	1.000

1132	conc o258	9520.91	8173.04	1347.87	1.000
1133	conc o259	5061.07	7154.14	-2093.07	1.000
1134	conc o260	3493.82	6291.94	-2798.12	1.000
1135	conc o261	5447.37	5571.14	-123.769	1.000
1136	conc o262	7290.70	4977.40	2313.30	1.000
1137	conc o263	7251.73	4497.52	2754.21	1.000
1138	conc o264	5666.69	4119.46	1547.23	1.000
1139	conc o265	4002.47	3832.40	170.074	1.000
1140	conc o266	3705.62	3626.64	78.9758	1.000
1141	conc o267	4079.18	3493.62	585.560	1.000
1142	conc o268	4342.79	3425.74	917.050	1.000
1143	conc o269	4657.45	3416.31	1241.14	1.000
1144	conc o270	4709.12	3459.41	1249.71	1.000
1145	conc o271	3662.07	3549.75	112.317	1.000
1146	conc o272	2533.16	3682.59	-1149.43	1.000
1147	conc o273	2971.71	3853.54	-881.827	1.000
1148	conc o274	3480.80	4058.53	-577.727	1.000
1149	conc o275	2837.98	4293.65	-1455.67	1.000
1150	conc o276	3585.37	4555.12	-969.747	1.000
1151	conc o277	5772.33	4839.13	933.195	1.000
1152	conc o278	5009.78	5141.90	-132.117	1.000
1153	conc o279	2281.37	5459.53	-3178.16	1.000
1154	conc o280	2563.73	5788.06	-3224.33	1.000
1155	conc o281	4521.34	6123.45	-1602.11	1.000
1156	conc o282	4986.85	6461.54	-1474.69	1.000
1157	conc o283	5110.52	6798.16	-1687.64	1.000
1158	conc o284	6018.91	7129.10	-1110.19	1.000
1159	conc o285	6769.64	7450.19	-680.553	1.000
1160	conc o286	7514.82	7757.34	-242.524	1.000
1161	conc o287	9606.69	8046.62	1560.07	1.000
1162	conc o288	11461.7	8314.29	3147.41	1.000
1163	conc o289	10743.1	8556.91	2186.19	1.000
1164	conc o290	10720.9	8771.33	1949.57	1.000
1165	conc o291	13733.1	8954.84	4778.26	1.000
1166	conc o292	14813.8	9105.11	5708.69	1.000
1167	conc o293	11710.4	9220.33	2490.07	1.000
	conc				

1168	o294 conc	7841.36	9299.16	-1457.80	1.000
1169	o295 conc	6105.19	9340.79	-3235.60	1.000
1170	o296 conc	6112.11	9344.95	-3232.84	1.000
1171	o297 conc	6769.24	9311.87	-2542.63	1.000
1172	o298 conc	7018.63	9242.30	-2223.67	1.000
1173	o299 conc	6603.01	9137.47	-2534.46	1.000
1174	o300 conc	6064.89	8999.04	-2934.15	1.000
1175	o301 conc	5981.44	8829.10	-2847.66	1.000
1176	o302 conc	6769.91	8630.06	-1860.15	1.000
1177	o303 conc	8101.42	8404.63	-303.209	1.000
1178	o304 conc	9429.78	8155.74	1274.04	1.000
1179	o305 conc	10216.6	7886.52	2330.08	1.000
1180	o306 conc	10232.1	7600.16	2631.94	1.000
1181	o307 conc	9650.45	7299.94	2350.51	1.000
1182	o308 conc	8673.18	6989.11	1684.07	1.000
1183	o309 conc	7502.49	6670.86	831.634	1.000
1184	o310 conc	6345.57	6348.24	-2.67393	1.000
1185	o311 conc	5411.55	6024.19	-612.644	1.000
1186	o312 conc	4907.69	5701.43	-793.739	1.000
1187	o313 conc	4888.55	5382.45	-493.902	1.000
1188	o314 conc	5145.72	5069.52	76.2003	1.000
1189	o315 conc	5444.77	4764.63	680.138	1.000
1190	o316 conc	5566.72	4469.52	1097.20	1.000
1191	o317 conc	5430.42	4185.64	1244.78	1.000
1192	o318 conc	5027.17	3914.19	1112.98	1.000
1193	o319 conc	4349.18	3656.10	693.077	1.000
1194	o320 conc	3446.13	3412.06	34.0730	1.000
1195	o321 conc	2499.34	3182.51	-683.166	1.000
1196	o322 conc	1708.47	2967.69	-1259.22	1.000
1197	o323 conc	1259.21	2767.65	-1508.44	1.000
1198	o324 conc	1157.75	2582.25	-1424.50	1.000
1199	o325 conc	1285.64	2411.23	-1125.59	1.000
1200	o326 conc	1521.98	2254.17	-732.193	1.000
1201	o327 conc	1760.85	2110.57	-349.716	1.000
1202	o328 conc	1942.61	1979.81	-37.2040	1.000
1203	o329 conc	2016.51	1861.25	155.256	1.000
1204	o330	1934.51	1754.18	180.332	1.000

1205	conc o331	1702.19	1657.85	44.3446	1.000
1206	conc o332	1373.90	1571.50	-197.602	1.000
1207	conc o333	1005.74	1494.39	-488.651	1.000
1208	conc o334	649.533	1425.76	-776.230	1.000
1209	conc o335	339.055	1364.89	-1025.83	1.000
1210	conc o336	103.355	1311.06	-1207.70	1.000
1211	conc o337	0.00000	1263.60	-1263.60	1.000
1212	conc o338	0.00000	1221.89	-1221.89	1.000
1213	conc o339	0.00000	1185.31	-1185.31	1.000
1214	conc o340	0.00000	1153.31	-1153.31	1.000
1215	conc o341	0.00000	1125.37	-1125.37	1.000
1216	conc o342	0.00000	1101.03	-1101.03	1.000
1217	conc o343	0.00000	1079.85	-1079.85	1.000
1218	conc o344	24.6039	1061.44	-1036.83	1.000
1219	conc o345	189.070	1045.44	-856.374	1.000
1220	conc o346	371.669	1031.55	-659.883	1.000
1221	conc o347	489.454	1019.48	-530.024	1.000
1222	conc o348	467.298	1008.97	-541.676	1.000
1223	conc o349	323.288	999.819	-676.531	1.000
1224	conc o350	136.783	991.819	-855.036	1.000
1225	conc o351	0.00000	984.804	-984.804	1.000
1226	conc o352	0.00000	978.628	-978.628	1.000
1227	conc o353	0.00000	973.162	-973.162	1.000
1228	conc o354	0.00000	968.296	-968.296	1.000
1229	conc o355	15.9872	963.936	-947.949	1.000
1230	conc o356	27.6263	960.000	-932.374	1.000
1231	conc o357	20.8621	956.419	-935.557	1.000
1232	conc o358	0.00000	953.135	-953.135	1.000
1233	conc o359	0.00000	950.098	-950.098	1.000
1234	conc o360	0.00000	947.266	-947.266	1.000
1235	conc o361	0.00000	944.604	-944.604	1.000
1236	conc o362	38.6360	942.083	-903.447	1.000
1237	conc o363	161.098	939.677	-778.579	1.000
1238	conc o364	316.812	937.367	-620.555	1.000
1239	conc o365	483.800	935.136	-451.336	1.000
1240	conc o366	642.739	932.969	-290.230	1.000
	conc				

1241	o367 conc	788.596	930.856	-142.260	1.000
1242	o368 conc	921.125	928.787	-7.66157	1.000
1243	o369 conc	1039.77	926.753	113.017	1.000
1244	o370 conc	1127.28	924.750	202.530	1.000
1245	o371 conc	1141.63	922.771	218.859	1.000
1246	o372 conc	1038.82	920.813	118.007	1.000
1247	o373 conc	787.834	918.872	-131.038	1.000
1248	o374 conc	454.309	916.946	-462.637	1.000
1249	o375 conc	147.371	915.032	-767.661	1.000
1250	o376 conc	0.00000	913.129	-913.129	1.000
1251	o377 conc	0.00000	911.235	-911.235	1.000
1252	o378 conc	178.614	909.350	-730.736	1.000
1253	o379 conc	464.396	907.471	-443.075	1.000
1254	o380 conc	806.740	905.599	-98.8592	1.000
1255	o381 conc	1155.84	903.733	252.107	1.000
1256	o382 conc	1461.89	901.873	560.017	1.000
1257	o383 conc	1676.50	900.018	776.482	1.000
1258	o384 conc	1760.11	898.167	861.943	1.000
1259	o385 conc	1676.55	896.322	780.228	1.000
1260	o386 conc	1390.50	894.480	496.020	1.000
1261	o387 conc	931.442	892.644	38.7983	1.000
1262	o388 conc	437.972	890.811	-452.839	1.000
1263	o389 conc	59.1618	888.983	-829.821	1.000
1264	o390 conc	0.00000	887.159	-887.159	1.000
1265	o391 conc	26.7570	885.339	-858.582	1.000
1266	o392 conc	267.289	883.523	-616.234	1.000
1267	o393 conc	557.398	881.710	-324.312	1.000
1268	o394 conc	817.031	879.902	-62.8713	1.000
1269	o395 conc	991.351	878.098	113.253	1.000
1270	o396 conc	1028.94	876.298	152.642	1.000
1271	o397 conc	885.073	874.501	10.5719	1.000
1272	o398 conc	598.276	872.708	-274.432	1.000
1273	o399 conc	263.623	870.920	-607.297	1.000
1274	o400 conc	0.00000	869.135	-869.135	1.000
1275	o401 conc	0.00000	867.353	-867.353	1.000
1276	o402 conc	0.00000	865.576	-865.576	1.000
1277	o403	0.00000	863.803	-863.803	1.000

1278	conc o404	152.637	862.033	-709.396	1.000
1279	conc o405	486.728	860.267	-373.539	1.000
1280	conc o406	803.196	858.504	-55.3085	1.000
1281	conc o407	999.271	856.746	142.525	1.000
1282	conc o408	1001.11	854.991	146.119	1.000
1283	conc o409	853.094	853.240	-0.146196	1.000
1284	conc o410	629.831	851.493	-221.662	1.000
1285	conc o411	404.922	849.749	-444.827	1.000
1286	conc o412	221.358	848.009	-626.651	1.000
1287	conc o413	86.4305	846.273	-759.843	1.000
1288	conc o414	5.41412	844.541	-839.127	1.000
1289	conc o415	0.00000	842.812	-842.812	1.000
1290	conc o416	0.00000	841.087	-841.087	1.000
1291	conc o417	1.83637	839.365	-837.529	1.000
1292	conc o418	0.00000	837.648	-837.648	1.000
1293	conc o419	20.0022	835.934	-815.931	1.000
1294	conc o420	167.357	834.223	-666.866	1.000
1295	conc o421	356.022	832.516	-476.494	1.000
1296	conc o422	487.104	830.813	-343.709	1.000
1297	conc o423	472.761	829.113	-356.352	1.000
1298	conc o424	331.322	827.417	-496.095	1.000
1299	conc o425	140.303	825.725	-685.422	1.000
1300	conc o426	0.00000	824.036	-824.036	1.000
1301	conc o427	0.00000	822.351	-822.351	1.000
1302	conc o428	0.00000	820.669	-820.669	1.000
1303	conc o429	0.00000	818.991	-818.991	1.000
1304	conc o430	77.2770	817.317	-740.040	1.000
1305	conc o431	224.980	815.646	-590.666	1.000
1306	conc o432	377.267	813.978	-436.711	1.000
1307	conc o433	507.381	812.315	-304.934	1.000
1308	conc o434	591.128	810.654	-219.526	1.000
1309	conc o435	612.737	808.998	-196.261	1.000
1310	conc o436	558.166	807.344	-249.178	1.000
1311	conc o437	415.570	805.695	-390.125	1.000
1312	conc o438	220.447	804.048	-583.601	1.000
1313	conc o439	53.8837	802.406	-748.522	1.000
	conc				

1314	o440	0.00000	800.766	-800.766	1.000
1315	conc o441	108.455	799.131	-690.676	1.000
1316	conc o442	303.139	797.498	-494.359	1.000
1317	conc o443	466.067	795.869	-329.802	1.000
1318	conc o444	483.141	794.244	-311.103	1.000
1319	conc o445	338.699	792.622	-453.923	1.000
1320	conc o446	141.219	791.004	-649.785	1.000
1321	conc o447	7.10519	789.389	-782.283	1.000
1322	conc o448	31.8670	787.777	-755.910	1.000
1323	conc o449	183.043	786.169	-603.126	1.000
1324	conc o450	379.758	784.564	-404.806	1.000
1325	conc o451	541.471	782.963	-241.492	1.000
1326	conc o452	618.586	781.365	-162.779	1.000
1327	conc o453	612.838	779.770	-166.932	1.000
1328	conc o454	530.791	778.179	-247.388	1.000
1329	conc o455	382.484	776.591	-394.107	1.000
1330	conc o456	207.541	775.007	-567.466	1.000
1331	conc o457	60.5508	773.426	-712.875	1.000
1332	conc o458	0.00000	771.848	-771.848	1.000
1333	conc o459	46.1642	770.274	-724.109	1.000
1334	conc o460	192.871	768.703	-575.832	1.000
1335	conc o461	411.737	767.135	-355.398	1.000
1336	conc o462	675.194	765.571	-90.3766	1.000
1337	conc o463	918.134	764.010	154.124	1.000
1338	conc o464	1050.34	762.452	287.888	1.000
1339	conc o465	981.197	760.897	220.300	1.000
1340	conc o466	681.595	759.346	-77.7513	1.000
1341	conc o467	304.360	757.798	-453.438	1.000
1342	conc o468	35.7788	756.254	-720.475	1.000
1343	conc o469	51.8214	754.713	-702.891	1.000
1344	conc o470	338.819	753.175	-414.356	1.000
1345	conc o471	716.697	751.640	-34.9430	1.000
1346	conc o472	999.732	750.109	249.623	1.000
1347	conc o473	1047.59	748.580	299.010	1.000
1348	conc o474	902.303	747.055	155.248	1.000
1349	conc o475	651.723	745.534	-93.8107	1.000
1350	conc o476	382.911	744.015	-361.104	1.000

1351	conc o477	159.502	742.500	-582.998	1.000
1352	conc o478	18.2148	740.988	-722.773	1.000
1353	conc o479	0.00000	739.479	-739.479	1.000
1354	conc o480	107.393	737.973	-630.580	1.000
1355	conc o481	291.838	736.471	-444.633	1.000
1356	conc o482	452.788	734.972	-282.184	1.000
1357	conc o483	496.542	733.476	-236.934	1.000
1358	conc o484	393.985	731.983	-337.998	1.000
1359	conc o485	213.383	730.493	-517.110	1.000
1360	conc o486	31.0702	729.007	-697.936	1.000
1361	conc o487	0.00000	727.523	-727.523	1.000
1362	conc o488	0.00000	726.043	-726.043	1.000
1363	conc o489	0.00000	724.566	-724.566	1.000
1364	conc o490	30.4946	723.092	-692.597	1.000
1365	conc o491	180.699	721.621	-540.922	1.000
1366	conc o492	340.231	720.153	-379.922	1.000
1367	conc o493	471.098	718.689	-247.591	1.000
1368	conc o494	538.884	717.227	-178.343	1.000
1369	conc o495	547.549	715.769	-168.220	1.000
1370	conc o496	524.384	714.313	-189.929	1.000
1371	conc o497	496.995	712.861	-215.866	1.000
1372	conc o498	484.919	711.412	-226.493	1.000
1373	conc o499	486.180	709.966	-223.786	1.000
1374	conc o500	495.254	708.523	-213.269	1.000

1375
1376 See file mfit.res for more details of residuals in graph-ready format.
1377

1378 See file mfit.seo for composite observation sensitivities.
1379

1380
1381 Objective function ----->
1382

1383 Sum of squared weighted residuals (ie phi) = 8.4623E+10
1384

1385
1386 Correlation Coefficient ----->
1387

1388 Correlation coefficient = 0.97756
1389

1390
1391 Analysis of residuals ----->
1392

1393 All residuals:-
1394 Number of residuals with non-zero weight = 500
1395 Mean value of non-zero weighted residuals = 539.2
1396 Maximum weighted residual [observation "o163"] = 6.2461E+04
1397 Minimum weighted residual [observation "o173"] = -8.8491E+04
1398 Standard variance of weighted residuals = 1.7341E+08

```
1399 Standard error of weighted residuals = 1.3168E+04
1400
1401 Note: the above variance was obtained by dividing the objective
1402 function by the number of system degrees of freedom (ie. number of
1403 observations with non-zero weight plus number of prior information
1404 articles with non-zero weight minus the number of adjustable parameters.)
1405 If the degrees of freedom is negative the divisor becomes
1406 the number of observations with non-zero weight plus the number of
1407 prior information items with non-zero weight.
1408
1409
1410 Covariance and other statistical matrices cannot be determined:-
1411 Memory conservation is operative so that covariance matrix is not calculated.
1412
1413
```