8. Stopping and Re-Starting PEST_HP

8.1 Resumption of Execution

Execution of PEST_HP can be terminated abruptly by typing <Ctl-C> while focussed on its working window. Alternatively, its execution can be terminated in a gentler manner using the PSTOP or PSTOPST commands; see below. Inadvertent termination of PEST_HP execution can follow power or network failure.

If execution of PEST_HP is prematurely terminated in any of these ways, it can be restarted using the "/s" switch. If its execution was terminated while undertaking model runs required for filling of the Jacobian matrix (normally the most time-consuming part of the inversion process), then PEST_HP will re-commence execution at exactly the same location in its processing sequence as that at which its execution was previously terminated. It will read the outcomes of model runs previously undertaken for filling of the Jacobian matrix from files that it uses for parallel run management; it will then complete the filling of this matrix by instructing its agents to undertake the remaining model runs.

If execution of PEST_HP was terminated while model runs were being undertaken for the purpose of testing parameter upgrades, PEST_HP will re-commence execution at that point of its processing sequence where upgrade calculation commenced. Normally, this does not constitute a degradation of efficiency because (as is described in section 2 of this document) PEST_HP often undertakes only one set of parallel runs during that phase of the inversion process in which upgraded parameter sets were calculated and tested. If PEST_HP execution was inadvertently terminated while these runs are being undertaken, they would need to be re-initiated anyway. Nevertheless, if model run times are significantly different for different parameter sets, there will be some wastage of model runs if PEST_HP execution was terminated after some model runs had been completed but before others had been completed. However this potential for run loss must be balanced against the fact that a restarted PEST_HP may not have the same number of agents at its disposal as the previously terminated PEST_HP. The Marquardt lambda selection strategy may therefore be different between the old and new PEST_HP runs.

If Broyden Jacobian updating is activated, then restart functionality presently implemented by PEST_HP will indeed result in the need to repeat the set of model runs based on the unimproved Jacobian matrix if cessation of execution occurred while model runs were being undertaken based on parameter upgrades calculated using the Broyden-improved Jacobian matrix.

If execution of PEST_HP was inadvertently terminated after commencement of execution using the "/f" command line switch, then its execution can be resumed using the "/s" switch, just as for a PEST_HP run that was undertaken for the purpose of solving an inverse problem. In this case execution of the re-started run should also be initiated using the "/f" switch. For example, if the PEST_HP manager was originally started using the command

```
pest_hp case /f /h :4004
```

then an interrupted run should be restarted using the command

```
pest_hp case /f /s /h :4004
```

If restarted in this manner, PEST_HP does not prompt for the names of the parameter value files which it must read, nor for the size of a parallel run packet, as it did on its original run. Instead, it obtains this information from its restart file; it then recommences its run at that point in its processing sequence at which its execution was previously terminated. Information calculated during the resumed run is appended to the original run record and run results files (as if execution of PEST_HP had never been interrupted in the first place).

8.2 Stopping and Pausing

In common with normal PEST and BEOPEST behaviour, the typing of "pstop" or "pstopst" in another command line window open to the PEST_HP manager's folder instigates cessation of PEST_HP execution; run agents cease execution when the model runs which they are respectively supervising are complete. If stopped using the "pstop" command, cessation of execution of the PEST_HP manager is immediate. If stopped using the "pstopst" command, the manager records information pertinent to the current inversion process at the end of its run record file before ceasing execution. In either case, execution of the prematurely terminated PEST_HP run can be resumed using the "/s" command line switch as discussed above.

As for the normal PEST and BEOPEST, execution of PEST_HP can be paused and resumed using the "pause" and "unpause" commands. As for the "pstop" and "pstopst" commands, these commands must be issued from a command line window which is open to the PEST_HP manager's working folder.

8.3 Special Considerations for the "/f" Switch

If PEST_HP is run using the "/f" switch, so that it records the outcomes of a sequence of model runs in a run results file, then its execution can be terminated using either the "pstop" or "pstopst" commands in the manner described above. However the PEST_HP manager responds slightly differently to each of these two commands. If stopped using the "pstop" command, cessation of the PEST_HP manager's execution is immediate. However if stopped using the "pstopst" command, the manager empties the parallel run register before ceasing execution. Thus model output values corresponding to model runs comprising the latest run packet which have already been completed are recorded in the run results file; meanwhile, corresponding objective functions are recorded in the run record file and written to the screen.

If stopped using the "pstop" or "pstopst" command, PEST_HP execution can be resumed using the "/s" switch together with the "/f" switch in the manner described above. However if execution of PEST_HP was terminated using the "pstopst" command, some information will be duplicated in both the run record and run results files upon resumption of PEST_HP execution, namely the outcomes of model runs comprising part of an interrupted run package which were actually completed prior to termination of the previous PEST_HP run. As stated above, these model run outcomes are recorded in these PEST_HP output files in accordance with its programmed response to the "pstopst" command.