Omega3P Sample Outputs

Overall

After a successful Omega3P run with typical set of parameters, there will be a few things to be watched:

- The screen print-out,
- output file,
- a subdirecory containing eigenvectors,
- optionally a set of mode files.

Notes about those files:

1. We will have more explanation about screen print-out in the next sections.
2. The file output contains some summary results such as mode frequency, wall loss quality factors, or external quality factors for each computed mode. It also contains some statistics such as the problem size, the number of elements, and timing of various stages in omega3p run.
3. The sub-directory should be preserved so that more postprocess can be done for the computed modes. Please see ACDTool for more details.
4. A set of mode files along with the mesh file can be visualized with ParaView.

A Complete Example for a lossless cavity

```
************************************************************
***        Omega3P V8.0.0 07/01/2009 $        ***
------------------------------------------------------------
 Copyright 2009, Advanced Computations Department
 SLAC National Accelerator Laboratory

************************************************************


Read Mesh: gun-v4.ncdf
Partitioning Method: parmetis
      Setup: Max:   0.007, Sum:   0.015, Balance:   1.002
   Matching: Max:   0.008, Sum:   0.015, Balance:   1.001
Contraction: Max:   0.011, Sum:   0.022, Balance:   1.001
   InitPart: Max:   0.001, Sum:   0.001, Balance:   1.000
    Project: Max:   0.000, Sum:   0.001, Balance:   1.000
 Initialize: Max:   0.002, Sum:   0.004, Balance:   1.002
      K-way: Max:   0.006, Sum:   0.011, Balance:   1.000
      Remap: Max:   0.000, Sum:   0.000, Balance:   1.000
      Total: Max:   0.035, Sum:   0.070, Balance:   1.000

************************************************************
*        Total Number of Elements read:         24868
*        Total Number of Elements used:         24868
*        Total Number of DOFs:         152902
************************************************************

Total Volume of the strucutre is : 0.0001593555890525991
Number of Grad DOFs: 27613

************************************************************
 ARPACK Loop:
Shift = 439.2566356039645
************************************************************
factorizing the matrix using MUMPS ...
Using ParMETIS for ordering...


Analysis step: 0.761027 seconds

        Maximal per-core estimated memory          451 MB
        Aggregated estimated memory          875 MB
        Maximal per-core estimated memory if OOC          184 MB
        Aggregated estimated memory if OOC          365 MB

Factorization step: 39.184121 seconds

         ncv=6         nev=2
 Number of converged eigenpairs = 2
eigenvalue:  2.726061596672462e+03          Frequency:  2.491200411267457e+09          Residual:   2.54e-11
eigenvalue:  3.545447315320415e+03          Frequency:  2.841033486606133e+09          Residual:   1.25e-09
COMMIT MODE: 0 FREQ = 2491200411.267457         k= 52.21169980638881        norm(v[0]) = 31.04704308504932
COMMIT MODE: 1 FREQ = 2841033486.606133         k= 59.54365890101494        norm(v[1]) = 33.84520753989371
Number of TriSolve: 39. Average time for one TriSolv: 0.287939
Computed Total Energy (normalized by Epsilon0/2): 0.999999999999992
Computed Total Energy (normalized by Epsilon0/2): 0.9999999999999895
```

Some Explanations

The following lines show the number of elements and number of DOFs in the computation:

```
 ***********************************************************
 *        Total Number of Elements read:         24868
 *        Total Number of Elements used:         24868
 *        Total Number of DOFs:         152902
 ***********************************************************
```

The following lines show the memory usage:

```
       Maximal per-core estimated memory          451 MB
       Aggregated estimated memory          875 MB
       Maximal per-core estimated memory if OOC          184 MB
       Aggregated estimated memory if OOC          365 MB
```

If the Maximal per-core memory is larger than what is available, user should either increase the number of cores in the computation or use other options such as Out-of-core (OOC) solver. Note that it may not be good to use excessively large number of cores in the computation (in fact, it may hurt performance or it may fail to get results if doing so). It is often a good idea to have a few thousand elements per core in the parallel computations.

The following lines show the resulting eigen frequencies.

```
 Number of converged eigenpairs = 2
eigenvalue:  2.726061596672462e+03          Frequency:  2.491200411267457e+09          Residual:   2.54e-11
eigenvalue:  3.545447315320415e+03          Frequency:  2.841033486606133e+09          Residual:   1.25e-09
```

Note that the residual of the eigenpair should be reasonably small to be a good solution.