

激波边界干扰算例计算步骤

1. 网格转换:

在总控文件 key.hypara 中设置任务类型为网格转换

```
int    nsimutask      = 1;  
string parafilename   = "./bin/grid_para.hypara";
```

并在网格控制文件 grid_para.hypara 中设置网格参数

```
int gridtype      = 1;  
int axisup        = 1;  
int from_gtype    = 2;  
string from_gfile = "./grid/3D_shock_wave.cgns";  
string out_gfile  = "./grid/3D_shock_wave.fts";
```

在 cfd_para.hypara 设置周期边界条件参数，根据本算例，选择旋转周期类型，旋转角度为 1 度。（注：由于周期边界条件涉及网格转换、分区、计算过程，因而将周期边界相关参数设置放在 cfd_para.hypara 文件中，在执行转换前完成周期相关参数设置）

```
// ----- Periodic Parameters -----  
//Notice:Periodic boundary only support translation or rotation along the X axis!  
// periodicType: Which symmetry plane is used in the mesh.  
//          0 -- without Periodic Boundary.  
//          1 -- Translational periodicity.  
//          2 -- Rotational periodicity.  
int periodicType      = 2;  
double translationLength = 0;  
double rotationAngle  = 1;
```

双击运行 PHengLElv3d0.exe 即可得到转换后的网格文件

3D_shock_wave.cgns	2021/3/25 13:17	CGNS 文件	3,118 KB
3D_shock_wave_0.bc	2021/3/26 8:34	BC 文件	1 KB
3D_shock_wave_0.bcmesh	2021/3/26 8:34	BCMESH 文件	66 KB
3D_shock_wave_0.bcname	2021/3/26 8:34	BCNAME 文件	1 KB
3D_shock_wave_0.fts	2021/3/26 8:34	FTS 文件	4,562 KB
3D_shock_wave_0.grd	2021/3/26 8:34	GRD 文件	3,034 KB
3D_shock_wave_0.inp	2021/3/26 8:34	INP 文件	2 KB
3D_shock_wave_0.link	2021/3/26 8:34	LINK 文件	1 KB

2. 网格分区:

在总控文件 key.hypara 中修改参数，设置任务类型为网格分区

```
int    nsimutask      = 3;
string parafilename   = "./bin/partition.hypara";
```

并在网格分区文件 partition.hypara 中设置网格参数

```
int pgridtype = 1;
int maxproc   = 4;

string original_grid_file = "./grid/3D_shock_wave.fts";
string partition_grid_file = "./grid/3D_shock_wave__4.fts";
int numberOfMultigrid = 1;
```

双击运行 PHengLElv3d0.exe 即可得到分区后的网格文件

<input type="checkbox"/> 3D_shock_wave_4_0.bc	2021/3/26 8:37	BC 文件	1 KB
<input type="checkbox"/> 3D_shock_wave_4_0.fts	2021/3/26 8:37	FTS 文件	4,601 KB
<input type="checkbox"/> 3D_shock_wave_4_0.link	2021/3/26 8:37	LINK 文件	1 KB

3. 运行算例:

在总控文件 key.hypara 中修改参数，设置任务类型为数值计算

```
int ndim      = 3;
int nparafile = 1;

int    nsimutask      = 0;
//string parafilename = "./bin/cfd_para_subsonic.hypara";
//string parafilename = "./bin/cfd_para_transonic.hypara";
//string parafilename = "./bin/cfd_para_supersonic.hypara";
string parafilename = "./bin/cfd_para_hypersonic.hypara";
//string parafilename = "./bin/incompressible.hypara";
```

修改对应结算器 cfd_para_hypersonic 文件中的主要计算参数

```
int maxSimuStep      = 20000;

int intervalStepFlow = 1000;
int intervalStepPlot = 1000;
int intervalStepForce = 100;
int intervalStepRes   = 50;

double refMachNumber = 7.11;
double attackd       = 0.00;
double angleSlide    = 0.00;

int inflowParaType = 0;
double refReNumber = 5.706e6;
double refDimensionalTemperature = 80;
```

```
double gridScaleFactor = 0.01;

double forceReferenceLengthSpanWise = 1.0;
double forceReferenceLength = 1.0;
double forceReferenceArea = 1.0;
double TorqueRefX = 0.0;
double TorqueRefY = 0.0;
double TorqueRefZ = 0.0;

int viscousType = 3;
string viscousName = "leq-sa";
```

cmd 进入工程目录，输入命令：mpirun -n 4 ./PHengLEIv3d0.exe 并行执

行程序