Main differences from the original source files

par_ini.d


```
1    ################################################
2    ##   parameters for COSMOS code          ##########
3    ##   ver1.00 by Chulmoon Yoo              ##########
4    ################################################
5    999999          # maximum step of the main loop
6    400.            # maximum time to evolve
7    3               # tab number of the bufer grids
8    10.             # amp
9    -60             # minimum grid number of x =-nmax-1
10   60              # maximum grid number of x =imax/2-1
11   0               # minimum grid number of y
12   60              # maximum grid number of y
13   0               # minimum grid number of z
14   60              # maximum grid number of z
15   -1.             # minimum coordinate of x
16   1.              # maximum coordinate of x
17   0.              # minimum coordinate of y
18   1.              # maximum coordinate of y
19   0.              # minimum coordinate of z
20   1.              # maximum coordinate of z
```

```
1    ################################################
2    ##   parameters for COSMOS code          ##########
3    ##   ver1.00 by Chulmoon Yoo              ##########
4    ################################################
5    3               # maximum step of the main loop
6    25.             # maximum time to evolve
7    3               # tab number of the bufer grids
```

simulation max steps and finish time

```
9    -36             # minimum grid number of x =-nmax-1
10   36              # maximum grid number of x =imax/2-1
11   0               # minimum grid number of y
12   36              # maximum grid number of y
13   0               # minimum grid number of z
14   36              # maximum grid number of z
15   -1.             # minimum coordinate of x
16   ...             # ...dinate of x
```

number of grids 60 -> 40

```
17   0.              # minimum coordinate of y
18   1.              # maximum coordinate of y
19   0.              # minimum coordinate of z
20   1.              # maximum coordinate of z
```

par_ini.d

```
33    ###################################################
34    ###   initial data parameter
35    ###################################################
36    0                       # 0:no continue 1:continue
37    ini_all.dat     # continue file
38    0.50            # amplitude
39    10.             # wave number
40    10.             # xi2 nonsphericity parameter 1
41    0.              # xi3 nonsphericity parameter 2
42    0.              # w3  alignment angle
43    0.              # amplitude for the scalar field
44    10.             # wave number for the scalar field
45    15.             # xi2s
46    0.              # xi3s
47    50.0            # Hubble
```

continue setting

```
33    ###################################################
34    ###   initial data parameter
35    ###################################################
36    1                       # 0:no continue 1:continue
37    ini_all.dat     # continue file
38    0.0             # amplitude
39    10.             # w
40    10.             # xi2 nonsphericity parameter 1
41    0.              # xi3 nonsphericity parameter 2
42    0.              # w3  alignment angle
43    0.65            #  amplitude for the scalar field
44    10.             #
45    15.             # xi2s
46    0.              # xi
47    50.0            # Hubble
```

not used in scalar_iso

initial iso-curvature profile

not used in scalar_iso

```
57    ###################################################
58    ###   parameters for output
59    ###################################################
60    0.5                  #1st part print interval boundary time
61    0.5             #2nd part
62    100.            #changing time for print interval
```

```
56    ###################################################
57    ###   parameters for output
58    ###################################################
59    5.0                  #1st part print interval boundary time
60    5.0             #2nd part
61    100.            #changing time for print interval
```

output interval setting

par_fmr.d

```
1    ####################################
2    ##  parameters for FMR in COSMOS code
3    ##  ver1.00  by Chulmoon Yoo on
4    ####################################
5    ##  maximum number of fmr layers
6    2
7    ##x-grid number for fmr region
8    15
9    25
10   0
11   ##y-grid number for fmr region
12   15
13   25
14   0
15   ##z-grid number for fmr region
16   15
17   25
18   0
19   ##values of the lapse for starting fmr
20   0.15
21   0.1
22   0.
```

```
1    ####################################
2    ##  parameters for FMR in COSMOS code
3    ##  ver1.00  by Chulmoon Yoo on
4    ####################################
5    ##  maximum number of fmr layers
6    2
7    ##x-grid number for fmr region
8    9
9    9
10   0
11   ##y-grid number for fmr region
12   9
13   9
14   0
15   ##z-grid number for fmr region
16   9
17   9
18   0
19   ##values of the lapse for starting fmr
20   0.3
21   0.15
22   0.
```

number of grids covered by a lower layer

lapse at the origin when an additional layer is introduced

cosmos.cpp

```
267        //setting for bools start
268        fld=true;                          // fluid evolution -> true/false
269        scl=true;                          // scalar evolution -> true/false
270        cuev=true;                         // curvature evaluation -> true/false
```

```
267        //setting for bools start
268        fld=true;                          // fluid evolution -> true/false
269        scl=true;                          // scalar evolution -> true/false
270        cuev=false;                        // curvature evaluation -> true/false
```

```
381        else
382        {
383            cout << "no continue" << endl;
384
385            //initial data setting start
386            //fmv->set_initial_scalar(mus,kks,xi2s,xi3s);
387            //#pragma omp barrier
388            fmv->initial_nonsph(mu,kk,xi2,xi3,xi2s,xi3s,w3);
389            // fmv->initial(mu);
390            #pragma omp barrier
391            printpack(fmv0,ln,pk,pl,filex,filey,filez,filex0z,filexy0);
392            //initial data setting end
393
394            //printpack(fmv0,ln,pk,pl,filex,filey,filez,filex0z,filexy0);
395        }
396        //reading continue or setting initial date end
```

no curvature calculation

```
398        else
399        {
400            cout << "no continue" << endl;
401
402            //initial data setting start
403            // fmv->set_initial_scalar(mus,kks,xi2s,xi3s);
404            //#pragma omp barrier
405            //fmv->initial_nonsph(mu,kk,xi2,xi3,xi2s,xi3s,w3);
406            fmv->initial(mus,kks);
407            #pragma omp barrier
408            printpack(fmv0,ln,pk,pl,filex,filey,filez,filex0z,filexy0);
409            //initial data setting end
410
411            //printpack(fmv0,ln,pk,pl,filex,filey,filez,filex0z,filexy0);
412        }
413        //reading continue or setting initial date end
```

initial data setting function changed

cosmos_initial_scalar.cpp

initial data setting function "void initial(double mus,double kks)"
is defined in cosmos_initial_scalar.cpp

makefile

```
33  # source file
34  SRC = $(PROG).cpp cosmos_bssn.cpp cosmos_initial.cpp cosmos_output.cpp cosmos_boundary.cpp cosmos_ahf.cpp cosmos_ipol.cpp
    cosmos_fluid.cpp cosmos_fmr.cpp
35  OBJS = $(SRC:%.$(LANG)=%.o)
```

```
33  # source file
34  SRC = $(PROG).cpp cosmos_initial_scalar.cpp ../cosmos_bssn.cpp ../cosmos_initial.cpp ../cosmos_output.cpp ../cosmos_boundary.cpp ../
    cosmos_ahf.cpp ../cosmos_ipol.cpp ../cosmos_fluid.cpp ../cosmos_fmr.cpp
35  OBJS = $(SRC:%.$(LANG)=%.o)
```

・cosmos.cpp and cosmos_bssn.cpp is used instead of the original
  ../cosmos.cpp and ../cosmos_bssn.cpp

・cosmos_initial_scalar.cpp is added to the list