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   9999999         # maximum step of the main loop
6   400.            # maximum time to evolve
7   3               # tab number of the bufer grids
8   10.             # amp
9   -40             # minimum grid number of x =-nmax-1
10  40              # maximum grid number of x =imax/2-1
11  0               # minimum grid number of y
12  40              # maximum grid number of y
13  0               # minimum grid number of z
14  40              # 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
```

number of grids 60 -> 40

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
```

```
33    ######################################################
34    ###  initial data parameter
35    ######################################################
36    0                # 0:no continue 1:continue
37    ini_all.dat      # continue file
38    0.83             # amplitude
39    10.              # wave number
40    0.               # 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
```

initial amplitude for the perturbation

nonsphericity parameter ->0

not used in adiabatic_spherical

```
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    10.0             #1st part print interval boundary time
60    10.0             #2nd part
61    100.             #changing time for print interval
```

output interval setting

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
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47    50.0           # Hubble
```

```
33    ################################################
34    ###  initial data parameter
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36    0              # 0:no continue 1:continue
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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
```

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

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

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
```

```
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

398     else
            no curvature calculation
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             initial data setting function changed
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
```

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