

# SPHERLSana\Reference\Manual

## 1.0

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# Chapter 1

## Todo List

### Member `printHelp()`

need to updated, and revise help text to better describe the program. Some improvements could include: -better describing the "-x" appended to the file name base -mention that some times it expects a file name base, while others it wants the full file name -mention file extensions and naming of output files i.e. what the outputfile for the radially averaged profile will be called -perhaps mention some of the additional scripts used to extend the functionality of SPHERLSanal



## Chapter 2

# Class Index

### 2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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# Chapter 3

## File Index

### 3.1 File List

Here is a list of all documented files with brief descriptions:

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## Chapter 4

# Class Documentation

### 4.1 watchzone Struct Reference

#### Public Attributes

- `std::vector< double > vecdT`
- `std::vector< double > vecdU_ip1half`
- `std::vector< double > vecdU_im1half`
- `std::vector< double > vecdU0_ip1half`
- `std::vector< double > vecdU0_im1half`
- `std::vector< double > vecdQ0`
- `std::vector< double > vecdV_jp1half`
- `std::vector< double > vecdV_jm1half`
- `std::vector< double > vecdQ1`
- `std::vector< double > vecdW_kp1half`
- `std::vector< double > vecdW_km1half`
- `std::vector< double > vecdQ2`
- `std::vector< double > vecdR_ip1half`
- `std::vector< double > vecdR_im1half`
- `std::vector< double > vecdDensity`
- `std::vector< double > vecdDensityAve`
- `std::vector< double > vecdE`
- `std::vector< double > vecdP`
- `std::vector< double > vecdTemp`
- `std::vector< double > vecdDeIM_r_t0`
- `std::vector< double > vecdDeIM_r`
- `std::vector< double > vecdErrorDeIM_r`

The documentation for this struct was generated from the following file:

- [main.h](#)



## Chapter 5

# File Documentation

### 5.1 main.cpp File Reference

```
#include "main.h" #include <math.h> #include <iomanip> ×
#include "eos.h" #include "mfhdf.h"
```

#### Functions

- int **main** (int argc, char \*argv[])
- void [printHelp](#) ()
- void **convertCollBinToAscii** (std::string sFileName)
- void **convertDistBinToAscii** (std::string sFileNameBase)
- void **combineBinFiles** (std::string sFileNameBase)
- bool **bFileExists** (std::string strFilename)
- void **convertCollAsciiToBin** (std::string sFileName)
- void **makeRadialProFromColBin** (std::string sFileName)
- void **fpSignalHandler** (int nSig)
- void **make2DSlice** (std::string sFileName, int nPlane, int nPlaneIndex)
- [watchzone](#) **readInWatchZone** (std::string sFileName)
- void **convertBinToLNA** (std::string sFileName)
- double **dCalRhoAve3D** (double \*\*\*\*\*dGrid, int nl, int nStartY, int nEndY, int nStartZ, int nEndZ)
- double [dCalRhoAve2D](#) (double \*\*\*\*\*dGrid, int nl, int nStartY, int nEndY, int nStartZ, int nEndZ)
- void [computeFourierTransFromList](#) (std::string sInFileName, std::string sOutFileName)
- void **computeFourierTrans** (std::string sInFileName, std::string sOutFileName)
- void [convertBinToHDF4](#) (std::string sFileName)

#### 5.1.1 Detailed Description

This code is used to manipulate the outputfiles generated by SHPERLS.

## 5.1.2 Function Documentation

5.1.2.1 `void computeFourierTransFromList( std::string sInFileName, std::string sOutFileName )`

Calculates a volume weighted average density given the grid variables, dGrid and the radial index, nI, the start and stop indices in the Y and Z direction. For the 2D case.

5.1.2.2 `void convertBinToHDF4( std::string sFileName )`

converts a collected binary file to an hdf file

References nC, nD, nDM, nE, nGamma, nKappa, nKE, nL\_con, nL\_rad, nM, nP, nPhi, nQ, nR, nT, nTheta, nU, nU0, nV, and nW.

5.1.2.3 `double dCalRhoAve2D( double **** dGrid, int nI, int nStartY, int nEndY, int nStartZ, int nEndZ )`

Calculates a volume weighted average density given the grid variables, dGrid and the radial index, nI, the start and stop indices in the Y and Z direction. For the 3D case.

References nD, nR, and nTheta.

5.1.2.4 `void printHelp( )`

**Todo** need to updated, and revise help text to better describe the program. Some improvements could include: -better describing the "-x" appended to the file name base -mention that some times it expects a file name base, while others it wants the full file name -mention file extensions and naming of output files i.e. what the outputfile for the radially averaged profile will be called -perhaps mention some of the additional scripts used to extend the functionality of SPHERLSanal

## 5.2 main.h File Reference

```
#include "../..//config.h"    #include <fftw3.h>    #include
"mfhdf.h" #include <cstdlib> #include <iostream> #include
<fstream> #include <sstream> #include <string> #include
<exception>    #include <sys/stat.h>    #include <cmath> ×
#include "exception2.h" #include <csignal> #include <fenv.-
h> #include <limits> #include <vector>
```

### Classes

- struct [watchzone](#)

## Functions

- void **convertDistBinToAscii** (std::string sFileNameBase)
- void **combineBinFiles** (std::string sFileNameBase)
- void **convertCollBinToAscii** (std::string sFileName)
- void **convertCollAsciiToBin** (std::string sFileName)
- void **makeRadialProFromColBin** (std::string sFileName)
- void [printHelp](#) ()
- bool **bFileExists** (std::string strFilename)
- void **fpSignalHandler** (int nSig)
- void **make2DSlice** (std::string sFileName, int nPlane, int nPlaneIndex)
- void **convertBinToLNA** (std::string sFileName)
- double **dCalRhoAve3D** (double \*\*\*\*dGrid, int nl, int nStartY, int nEndY, int nStartZ, int nEndZ)
- double [dCalRhoAve2D](#) (double \*\*\*\*dGrid, int nl, int nStartY, int nEndY, int nStartZ, int nEndZ)
- void [computeFourierTransFromList](#) (std::string sInFileName, std::string sOutFileName)
- void **computeFourierTrans** (std::string sInFileName, std::string sOutFileName)
- void [convertBinToHDF4](#) (std::string sFileName)

## Variables

- int [nM](#)
- int [nTheta](#)
- int [nPhi](#)
- int [nDM](#)
- int [nR](#)
- int [nD](#)
- int [nU](#)
- int [nU0](#)
- int [nV](#)
- int [nW](#)
- int [nE](#)
- int [nT](#)
- int [nP](#)
- int [nQ](#)
- int [nKappa](#)
- int [nGamma](#)
- int [nL\\_rad](#)
- int [nL\\_con](#)
- int [nKE](#)
- int [nC](#)
- int [nF\\_con](#)
- int [nPrecisionAscii](#) = 16
- bool [bScientific](#) = true

- const double `dPi` = 3.1415926535897932384626433832795
- const double `dSigma` = 5.67040040E-5
- const double `dLSun` = 3.839e33
- const int `nDumpFileVersion` = 1
- bool `bExtraInfoInProfile` = false
- std::string `sEOSFile` = ""

### 5.2.1 Detailed Description

Header file for `main.cpp`.

### 5.2.2 Function Documentation

**5.2.2.1** `void computeFourierTransFromList( std::string sInFileName, std::string sOutFileName )`

Calculates a volume weighted average density given the grid variables, `dGrid` and the radial index, `nl`, the start and stop indices in the Y and Z direction. For the 2D case.

**5.2.2.2** `void convertBinToHDF4( std::string sFileName )`

converts a collected binary file to an hdf file

References `nC`, `nD`, `nDM`, `nE`, `nGamma`, `nKappa`, `nKE`, `nL_con`, `nL_rad`, `nM`, `nP`, `nPhi`, `nQ`, `nR`, `nT`, `nTheta`, `nU`, `nU0`, `nV`, and `nW`.

**5.2.2.3** `double dCalRhoAve2D( double **** dGrid, int nl, int nStartY, int nEndY, int nStartZ, int nEndZ )`

Calculates a volume weighted average density given the grid variables, `dGrid` and the radial index, `nl`, the start and stop indices in the Y and Z direction. For the 3D case.

References `nD`, `nR`, and `nTheta`.

**5.2.2.4** `void printHelp( )`

**Todo** need to updated, and revise help text to better describe the program. Some improvements could include: -better describing the "-x" appended to the file name base -mention that some times it expects a file name base, while others it wants the full file name -mention file extensions and naming of output files i.e. what the outputfile for the radially averaged profile will be called -perhaps mention some of the additional scripts used to extend the functionality of SPHERLSanal



### 5.2.3 Variable Documentation

#### 5.2.3.1 bool `bExtraInfoInProfile` = false

If true include extra information in radial profile about equation of state and opacity derivatives.

#### 5.2.3.2 bool `bScientific` = true

Output ascii files in scientific format

#### 5.2.3.3 const double `dLSun` = 3.839e33

Luminosity of the sun in erg/s

#### 5.2.3.4 const double `dPi` = 3.1415926535897932384626433832795

Pi

#### 5.2.3.5 const double `dSigma` = 5.67040040E-5

Boltzman constant

#### 5.2.3.6 int `nC`

Index of the sound speed.

Referenced by `convertBinToHDF4()`.

#### 5.2.3.7 int `nD`

Index of  $\rho$ , density, in grids, This should be the same as that used in SPHERLS defined in `global.h`

Referenced by `convertBinToHDF4()`, and `dCalRhoAve2D()`.

#### 5.2.3.8 int `nDM`

Index of  $\delta M$  in grids, This should be the same as that used in SPHERLS defined in `global.h`

Referenced by `convertBinToHDF4()`.

**5.2.3.9 const int nDumpFileVersion = 1**

Version of the dump file supported

**5.2.3.10 int nE**

Index of  $E$ , internal energy, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.11 int nF\_con**

Index of the convective luminosity.

**5.2.3.12 int nGamma**

Index of the adiabatic gamma.

Referenced by convertBinToHDF4().

**5.2.3.13 int nKappa**

Index of the opacity in grids.

Referenced by convertBinToHDF4().

**5.2.3.14 int nKE**

Index of the Kinetic energy.

Referenced by convertBinToHDF4().

**5.2.3.15 int nL\_con**

Index of the Convective Luminosity.

Referenced by convertBinToHDF4().

**5.2.3.16 int nL\_rad**

Index of the Radiative Luminosity.

Referenced by convertBinToHDF4().

**5.2.3.17 int nM**

Index of  $M_r$  in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.18 int nP**

Index of  $P$ , pressure

Referenced by convertBinToHDF4().

**5.2.3.19 int nPhi**

Index of  $\phi$  in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.20 int nPrecisionAscii = 16**

Set presicision of ascii output

**5.2.3.21 int nQ**

Index of the artificial viscosity in grids.

Referenced by convertBinToHDF4().

**5.2.3.22 int nR**

Index of  $R$ , radius, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4(), and dCalRhoAve2D().

**5.2.3.23 int nT**

Index of  $T$ , temperature, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.24 int nTheta**

Index of  $\theta$  in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4(), and dCalRhoAve2D().

**5.2.3.25 int nU**

Index of  $u$ , radial velocity, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.26 int nU0**

Index of  $u_0$ , radial grid velocity, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.27 int nV**

Index of  $v$ , theta velocity in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.28 int nW**

Index of  $w$ , phi velocity, in grids, This should be the same as that used in SPHERLS defined in global.h

Referenced by convertBinToHDF4().

**5.2.3.29 std::string sEOSFile = ""**

path to an equation of state file, used for overriding the path/eos file in the model files.

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