

gm3d

1.0

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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obspoint	22
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modelist	21
option	22
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Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

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Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

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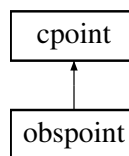
Chapter 4

Data Structure Documentation

4.1 cpoint Struct Reference

```
#include <head_func.h>
```

Inheritance diagram for cpoint:



Data Fields

- int `id` = -1
- double `x` = `BDL_MAX`
- double `y` = `BDL_MAX`
- double `z` = `BDL_MAX`

4.1.1 Field Documentation

4.1.1.1 id

```
int cpoint::id = -1
```

4.1.1.2 x

```
double cpoint::x = BDL_MAX
```

4.1.1.3 y

```
double cpoint::y = BDL_MAX
```

4.1.1.4 z

```
double cpoint::z = BDL_MAX
```

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

- /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/[head_func.h](#)

4.2 cube Struct Reference

```
#include <head_func.h>
```

Data Fields

- [cpoint](#) [cen](#)
- int [ids](#) [8] = {-1,-1,-1,-1,-1,-1,-1,-1}
- double [dx](#) = [BDL_MAX](#)
- double [dy](#) = [BDL_MAX](#)
- double [dz](#) = [BDL_MAX](#)

4.2.1 Field Documentation

4.2.1.1 cen

```
cpoint cube::cen
```

4.2.1.2 dx

```
double cube::dx = BDL\_MAX
```


4.2.1.3 dy

```
double cube::dy = BDL_MAX
```

4.2.1.4 dz

```
double cube::dz = BDL_MAX
```

4.2.1.5 ids

```
int cube::ids[8] = {-1,-1,-1,-1,-1,-1,-1,-1}
```

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

- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/head_func.h](#)

4.3 DispHelp Class Reference

```
#include <disp_help.h>
```

Public Member Functions

- [DispHelp \(\)](#)
- [~DispHelp \(\)](#)
- void [addHeadInfo](#) (string, string, string, string)
- void [addUsage](#) (string)
- void [addOption](#) (string, string, string)
- void [addOptionSec](#) (string, int)
- void [addExample](#) (string)
- void [changeLayerOut](#) (int, int)
- void [show](#) ()

Private Attributes

- string [ex_name](#)
- string [version](#)
- string [descript](#)
- string [author](#)
- int [front_space](#)
- int [back_space](#)
- [opArray](#) [options](#)
- [strArray](#) [examples](#)
- [strArray](#) [usages](#)

4.3.1 Constructor & Destructor Documentation

4.3.1.1 DispHelp()

```
DispHelp::DispHelp ( ) [inline]
```

4.3.1.2 ~DispHelp()

```
DispHelp::~~DispHelp ( ) [inline]
```

4.3.2 Member Function Documentation

4.3.2.1 addExample()

```
void DispHelp::addExample (
    string ex )
```

4.3.2.2 addHeadInfo()

```
void DispHelp::addHeadInfo (
    string s1,
    string s2,
    string s3,
    string s4 )
```

4.3.2.3 addOption()

```
void DispHelp::addOption (
    string msg,
    string sflag,
    string lflag = "" )
```

4.3.2.4 addOptionSec()

```
void DispHelp::addOptionSec (
    string msg,
    int index = -1 )
```

4.3.2.5 addUsage()

```
void DispHelp::addUsage (
    string usg )
```

4.3.2.6 changeLayerOut()

```
void DispHelp::changeLayerOut (
    int left,
    int right )
```

4.3.2.7 show()

```
void DispHelp::show ( )
```

4.3.3 Field Documentation

4.3.3.1 author

```
string DispHelp::author [private]
```

4.3.3.2 back_space

```
int DispHelp::back_space [private]
```

4.3.3.3 `descript`

```
string DispHelp::descript [private]
```

4.3.3.4 `ex_name`

```
string DispHelp::ex_name [private]
```

4.3.3.5 `examples`

```
strArray DispHelp::examples [private]
```

4.3.3.6 `front_space`

```
int DispHelp::front_space [private]
```

4.3.3.7 `options`

```
opArray DispHelp::options [private]
```

4.3.3.8 `usages`

```
strArray DispHelp::usages [private]
```

4.3.3.9 `version`

```
string DispHelp::version [private]
```

The documentation for this class was generated from the following files:

- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/disp_help.h](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/disp_help.cpp](#)

4.4 GM3D Class Reference

```
#include <gm3d.h>
```

Public Member Functions

- [GM3D](#) ()
- [~GM3D](#) ()
- [int BuildRegularGrid](#) (char *)
- [int AddModels](#) (char *)
- [int AddRegularBlock](#) (modelist)
- [int AddTiltedBlock](#) (modelist)
- [int AddSphereBlock](#) (modelist)
- [int AddInterfaceBlock](#) (modelist)
- [int ReadModel](#) (char *, char *)
- [int RegisteredOutput](#) (bool)
- [int OutMshFile](#) (char *, string)
- [int OutNeighborFile](#) (char *, char *)
- [int InitObs](#) (char *)
- [int OutObs](#) (char *)
- [int ForwardVz](#) (char *)
- [int ForwardVzx](#) (char *)
- [int ForwardVzy](#) (char *)
- [int ForwardVzz](#) (char *)
- [int ForwardDeltaT](#) (char *, char *)
- [int ForwardDeltaTx](#) (char *, char *)
- [int ForwardDeltaTy](#) (char *, char *)
- [int ForwardDeltaTz](#) (char *, char *)
- [int ForwardHax](#) (char *, char *)
- [int ForwardHay](#) (char *, char *)
- [int ForwardZa](#) (char *, char *)

Private Attributes

- [int obs_num_](#)
- [int model_num_](#)
- [int vert_num_](#)
- [obspointArray obs_p_](#)
- [_2dArray input_models_](#)
- [_1sArray input_model_names_](#)
- [_1dArray forward_model_](#)
- [cubeArray model_cube_](#)
- [cpointArray model_vert_](#)
- [_1dArray model_block_val_](#)
- [modelistArray model_list_](#)
- [_1iArray out_ele_ids_](#)
- [_1iArray out_ele_data_ids_](#)
- [_1iArray out_vert_ids_](#)
- [_int2intMap vert_out_map_](#)
- [_int2intMap ele_data_out_map_](#)
- [_2iArray model_vert_neighbor_](#)
- [_2iArray model_cube_neighbor_](#)

4.4.1 Constructor & Destructor Documentation

4.4.1.1 GM3D()

```
GM3D::GM3D ( ) [inline]
```

4.4.1.2 ~GM3D()

```
GM3D::~~GM3D ( ) [inline]
```

4.4.2 Member Function Documentation

4.4.2.1 AddInterfaceBlock()

```
int GM3D::AddInterfaceBlock (
    modelist para_list )
```

4.4.2.2 AddModels()

```
int GM3D::AddModels (
    char * filename )
```

4.4.2.3 AddRegularBlock()

```
int GM3D::AddRegularBlock (
    modelist para_list )
```

4.4.2.4 AddSphereBlock()

```
int GM3D::AddSphereBlock (
    modelist para_list )
```

4.4.2.5 AddTiltedBlock()

```
int GM3D::AddTiltedBlock (
    modelist para_list )
```

4.4.2.6 BuildRegularGrid()

```
int GM3D::BuildRegularGrid (
    char * space_para )
```

4.4.2.7 ForwardDeltaT()

```
int GM3D::ForwardDeltaT (
    char * noise_level,
    char * mag_para )
```

4.4.2.8 ForwardDeltaTx()

```
int GM3D::ForwardDeltaTx (
    char * noise_level,
    char * mag_para )
```

4.4.2.9 ForwardDeltaTy()

```
int GM3D::ForwardDeltaTy (
    char * noise_level,
    char * mag_para )
```

4.4.2.10 ForwardDeltaTz()

```
int GM3D::ForwardDeltaTz (
    char * noise_level,
    char * mag_para )
```

4.4.2.11 ForwardHax()

```
int GM3D::ForwardHax (
    char * noise_level,
    char * mag_para )
```

4.4.2.12 ForwardHay()

```
int GM3D::ForwardHay (
    char * noise_level,
    char * mag_para )
```

4.4.2.13 ForwardVz()

```
int GM3D::ForwardVz (
    char * noise_level )
```

4.4.2.14 ForwardVzx()

```
int GM3D::ForwardVzx (
    char * noise_level )
```

4.4.2.15 ForwardVzy()

```
int GM3D::ForwardVzy (
    char * noise_level )
```

4.4.2.16 ForwardVzz()

```
int GM3D::ForwardVzz (
    char * noise_level )
```


4.4.2.17 ForwardZa()

```
int GM3D::ForwardZa (
    char * noise_level,
    char * mag_para )
```

4.4.2.18 InitObs()

```
int GM3D::InitObs (
    char * obs_para )
```

4.4.2.19 OutMshFile()

```
int GM3D::OutMshFile (
    char * filename,
    string data_name )
```

4.4.2.20 OutNeighborFile()

```
int GM3D::OutNeighborFile (
    char * v_name,
    char * b_name )
```

4.4.2.21 OutObs()

```
int GM3D::OutObs (
    char * filename )
```

4.4.2.22 ReadModel()

```
int GM3D::ReadModel (
    char * filename,
    char * input_forward_model_name )
```

4.4.2.23 RegisteredOuput()

```
int GM3D::RegisteredOuput (
    bool remove_empty_element )
```

4.4.3 Field Documentation

4.4.3.1 ele_data_out_map_

```
_int2intMap GM3D::ele_data_out_map_ [private]
```

4.4.3.2 forward_model_

```
_ldArray GM3D::forward_model_ [private]
```

4.4.3.3 input_model_names_

```
_lsArray GM3D::input_model_names_ [private]
```

4.4.3.4 input_models_

```
_2dArray GM3D::input_models_ [private]
```

4.4.3.5 model_block_val_

```
_ldArray GM3D::model_block_val_ [private]
```

4.4.3.6 model_cube_

```
cubeArray GM3D::model_cube_ [private]
```

4.4.3.7 model_cube_neighbor_

`_2iArray` GM3D::model_cube_neighbor_ [private]

4.4.3.8 model_list_

`modelistArray` GM3D::model_list_ [private]

4.4.3.9 model_num_

`int` GM3D::model_num_ [private]

4.4.3.10 model_vert_

`cpointArray` GM3D::model_vert_ [private]

4.4.3.11 model_vert_neighbor_

`_2iArray` GM3D::model_vert_neighbor_ [private]

4.4.3.12 obs_num_

`int` GM3D::obs_num_ [private]

4.4.3.13 obs_p_

`obspointArray` GM3D::obs_p_ [private]

4.4.3.14 out_ele_data_ids_

`_liArray` GM3D::out_ele_data_ids_ [private]

4.4.3.15 out_ele_ids_

```
_liArray GM3D::out_ele_ids_ [private]
```

4.4.3.16 out_vert_ids_

```
_liArray GM3D::out_vert_ids_ [private]
```

4.4.3.17 vert_num_

```
int GM3D::vert_num_ [private]
```

4.4.3.18 vert_out_map_

```
_int2intMap GM3D::vert_out_map_ [private]
```

The documentation for this class was generated from the following files:

- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/gm3d.h](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_interface_block.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_models.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_regular_block.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_sphere_block.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_tilted_block.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/build_regular_grid.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_t.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_tx.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_ty.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_tz.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_hax.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_hay.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vz.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzx.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzy.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzz.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_za.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/init_obs.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_msh_file.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_neighbor_file.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_obs.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/read_model.cpp](#)
- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/registered_output.cpp](#)

4.5 modelist Struct Reference

```
#include <head_func.h>
```

Data Fields

- char [mod_type](#) [1024]
- char [val_type](#) [1024]
- char [mod_para](#) [1024]
- double [mod_value](#)

4.5.1 Field Documentation

4.5.1.1 mod_para

```
char modelist::mod_para[1024]
```

4.5.1.2 mod_type

```
char modelist::mod_type[1024]
```

4.5.1.3 mod_value

```
double modelist::mod_value
```

4.5.1.4 val_type

```
char modelist::val_type[1024]
```

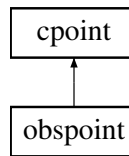
The documentation for this struct was generated from the following file:

- /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/[head_func.h](#)

4.6 obspoint Struct Reference

```
#include <head_func.h>
```

Inheritance diagram for obspoint:



Data Fields

- double `val` = [BDL_MAX](#)
- double `dev` = [BDL_MAX](#)

4.6.1 Field Documentation

4.6.1.1 dev

```
double obspoint::dev = BDL\_MAX
```

4.6.1.2 val

```
double obspoint::val = BDL\_MAX
```

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

- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/head_func.h](#)

4.7 option Struct Reference

```
#include <disp_help.h>
```

Public Member Functions

- [option](#) ()

Data Fields

- string [flag_s](#)
- string [flag_l](#)
- string [message](#)
- [strArray](#) [sec_message](#)

4.7.1 Constructor & Destructor Documentation

4.7.1.1 option()

```
option::option ( ) [inline]
```

4.7.2 Field Documentation

4.7.2.1 flag_l

```
string option::flag_l
```

4.7.2.2 flag_s

```
string option::flag_s
```

4.7.2.3 message

```
string option::message
```

4.7.2.4 sec_message

```
strArray option::sec_message
```

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

- [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/disp_help.h](#)

4.8 ProgressBar Class Reference

```
#include <progress_bar.h>
```

Public Member Functions

- [ProgressBar](#) ()
- [ProgressBar](#) (unsigned long n_, const char *description_="", std::ostream &out_=std::cerr)
- void [SetFrequencyUpdate](#) (unsigned long frequency_update_)
- void [SetStyle](#) (const char *unit_bar_, const char *unit_space_)
- void [Progressed](#) (unsigned long idx_)

Private Member Functions

- void [ClearBarField](#) ()
- int [GetConsoleWidth](#) ()
- int [GetBarLength](#) ()

Private Attributes

- unsigned long [n](#)
- unsigned int [desc_width](#)
- unsigned long [frequency_update](#)
- std::ostream * [out](#)
- const char * [description](#)
- const char * [unit_bar](#)
- const char * [unit_space](#)

4.8.1 Constructor & Destructor Documentation

4.8.1.1 [ProgressBar\(\)](#) [1/2]

```
ProgressBar::ProgressBar ( )
```

4.8.1.2 [ProgressBar\(\)](#) [2/2]

```
ProgressBar::ProgressBar (
    unsigned long n_,
    const char * description_ = "",
    std::ostream & out_ = std::cerr )
```


4.8.2 Member Function Documentation

4.8.2.1 ClearBarField()

```
void ProgressBar::ClearBarField ( ) [private]
```

4.8.2.2 GetBarLength()

```
int ProgressBar::GetBarLength ( ) [private]
```

4.8.2.3 GetConsoleWidth()

```
int ProgressBar::GetConsoleWidth ( ) [private]
```

4.8.2.4 Progressed()

```
void ProgressBar::Progressed (
    unsigned long idx_ )
```

4.8.2.5 SetFrequencyUpdate()

```
void ProgressBar::SetFrequencyUpdate (
    unsigned long frequency_update_ )
```

4.8.2.6 SetStyle()

```
void ProgressBar::SetStyle (
    const char * unit_bar_,
    const char * unit_space_ )
```

4.8.3 Field Documentation

4.8.3.1 desc_width

```
unsigned int ProgressBar::desc_width [private]
```

4.8.3.2 description

```
const char* ProgressBar::description [private]
```

4.8.3.3 frequency_update

```
unsigned long ProgressBar::frequency_update [private]
```

4.8.3.4 n

```
unsigned long ProgressBar::n [private]
```

4.8.3.5 out

```
std::ostream* ProgressBar::out [private]
```

4.8.3.6 unit_bar

```
const char* ProgressBar::unit_bar [private]
```

4.8.3.7 unit_space

```
const char* ProgressBar::unit_space [private]
```

The documentation for this class was generated from the following files:

- /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/[progress_bar.h](#)
- /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/[progress_bar.cpp](#)

Chapter 5

File Documentation

5.1 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_interface_block.cpp](#) File Reference

```
#include "gm3d.h"
```

5.2 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_models.cpp](#) File Reference

```
#include "gm3d.h"
```

5.3 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_regular_block.cpp](#) File Reference

```
#include "gm3d.h"
```

5.4 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_sphere_block.cpp](#) File Reference

```
#include "gm3d.h"
```

5.5 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/add_tilted_block.cpp](#) File Reference

```
#include "gm3d.h"
```

5.6 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/build_regular_grid.cpp](#) File Reference

```
#include "gm3d.h"
```

5.7 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/disp_help.cpp](#) File Reference

```
#include "disp_help.h"
```

5.8 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/disp_help.h](#) File Reference

```
#include <iostream>
#include <sstream>
#include <fstream>
#include <string.h>
#include <stdlib.h>
#include <stdio.h>
#include <unistd.h>
#include <iomanip>
#include <sys/ioctl.h>
#include "vector"
```

Data Structures

- struct [option](#)
- class [DispHelp](#)

Typedefs

- typedef vector< string > [strArray](#)
- typedef vector< [option](#) > [opArray](#)

5.8.1 Typedef Documentation

5.8.1.1 opArray

```
typedef vector<option> opArray
```

5.8.1.2 strArray

```
typedef vector<string> strArray
```

5.9 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_t.cpp File Reference

```
#include "gm3d.h"
```

5.10 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_tx.cpp File Reference

```
#include "gm3d.h"
```

5.11 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_ty.cpp File Reference

```
#include "gm3d.h"
```

5.12 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_delta_tz.cpp File Reference

```
#include "gm3d.h"
```

5.13 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_hax.cpp File Reference

```
#include "gm3d.h"
```

5.14 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_hay.cpp File Reference

```
#include "gm3d.h"
```

5.15 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vz.cpp](#) File Reference

```
#include "gm3d.h"
```

5.16 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzx.cpp](#) File Reference

```
#include "gm3d.h"
```

5.17 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzy.cpp](#) File Reference

```
#include "gm3d.h"
```

5.18 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_vzz.cpp](#) File Reference

```
#include "gm3d.h"
```

5.19 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/forward_za.cpp](#) File Reference

```
#include "gm3d.h"
```

5.20 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/gm3d.h](#) File Reference

```
#include "head_func.h"  
#include "progress_bar.h"
```

Data Structures

- class [GM3D](#)

5.21 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/head_func.cpp File Reference

```
#include "head_func.h"
```

Functions

- [cpoint operator](#) - ([cpoint](#) a, [cpoint](#) b)
- double [modCpoint](#) ([cpoint](#) v)
- double [arctg](#) (double v)
- stringstream [str2ss](#) (string s)
- string [cpoint_id](#) ([cpoint](#) c)
- int [open_infile](#) (ifstream &infile, char *filename)
- int [open_outfile](#) (ofstream &outfile, char *filename)
- double [grid_interpolate](#) (double x0, double y0, double dx, double dy, double x, double y, double d0, double d1, double d2, double d3)

5.21.1 Function Documentation

5.21.1.1 [arctg\(\)](#)

```
double arctg (  
    double v )
```

5.21.1.2 [cpoint_id\(\)](#)

```
string cpoint_id (  
    cpoint c )
```

5.21.1.3 [grid_interpolate\(\)](#)

```
double grid_interpolate (  
    double x0,  
    double y0,  
    double dx,  
    double dy,  
    double x,  
    double y,  
    double d0,  
    double d1,  
    double d2,  
    double d3 )
```

5.21.1.4 modCpoint()

```
double modCpoint (
    cpoint v )
```

5.21.1.5 open_infile()

```
int open_infile (
    ifstream & infile,
    char * filename )
```

5.21.1.6 open_outfile()

```
int open_outfile (
    ofstream & outfile,
    char * filename )
```

5.21.1.7 operator -()

```
cpoint operator - (
    cpoint a,
    cpoint b )
```

5.21.1.8 str2ss()

```
stringstream str2ss (
    string s )
```

5.22 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/head_func.h File Reference

```
#include "iostream"
#include "fstream"
#include "sstream"
#include "string.h"
#include "cmath"
#include "iomanip"
#include "stdio.h"
#include "stdlib.h"
#include "unistd.h"
#include "vector"
#include "map"
#include "algorithm"
#include "ctime"
#include "omp.h"
#include "random"
```


Data Structures

- struct [modelist](#)
- struct [cpoint](#)
- struct [obspoint](#)
- struct [cube](#)

Macros

- #define [BDL_MAX](#) 1e+30
- #define [BDL_MIN](#) -1e+30
- #define [PRECISION](#) 16
- #define [ZERO](#) 1e-16
- #define [Pi](#) (4.0*atan(1.0))
- #define [G0](#) 6.67408e-3
- #define [T0](#) 5.0e+4
- #define [MAX](#)(a, b) (a>b?a:b)
- #define [MIN](#)(a, b) (a<b?a:b)
- #define [SetToBox](#)(a, b, in) ([MAX](#)(a,[MIN](#)(b,in)))
- #define [BOLDRED](#) "\033[1m\033[31m"
- #define [BOLDGREEN](#) "\033[1m\033[32m"
- #define [BOLDYELLOW](#) "\033[1m\033[33m"
- #define [BOLDBLUE](#) "\033[1m\033[34m"
- #define [UNDERLINE](#) "\033[1m\033[4m"
- #define [RESET](#) "\033[0m"
- #define [MOVEUP](#)(x) printf("\033[%dA", (x))
- #define [MOVEDOWN](#)(x) printf("\033[%dB", (x))
- #define [MOVELEFT](#)(x) printf("\033[%dD", (x))
- #define [MOVERIGHT](#)(x) printf("\033[%dC", (x))
- #define [MOVETO](#)(y, x) printf("\033[%d;%dH", (y), (x))
- #define [CLEARLINE](#) "\033[K"
- #define [CLEARALL](#) "\033[2J"

Typedefs

- typedef vector< int > [_1iArray](#)
- typedef vector< double > [_1dArray](#)
- typedef vector< string > [_1sArray](#)
- typedef vector< vector< int > > [_2iArray](#)
- typedef vector< vector< double > > [_2dArray](#)
- typedef map< int, int > [_int2intMap](#)
- typedef vector< [modelist](#) > [modelistArray](#)
- typedef vector< [cpoint](#) > [cpointArray](#)
- typedef map< string, [cpoint](#) > [_str2pointMap](#)
- typedef vector< [obspoint](#) > [obspointArray](#)
- typedef vector< [cube](#) > [cubeArray](#)

Functions

- [cpoint operator](#) - ([cpoint](#), [cpoint](#))
- double [modCpoint](#) ([cpoint](#))
- double [arctg](#) (double)
- stringstream [str2ss](#) (string)
- string [cpoint_id](#) ([cpoint](#))
- int [open_infile](#) (ifstream &, char *)
- int [open_outfile](#) (ofstream &, char *)
- double [grid_interpolate](#) (double, double, double, double, double, double, double, double, double, double, double)

5.22.1 Macro Definition Documentation

5.22.1.1 BDL_MAX

```
#define BDL_MAX 1e+30
```

5.22.1.2 BDL_MIN

```
#define BDL_MIN -1e+30
```

5.22.1.3 BOLDBLUE

```
#define BOLDBLUE "\033[1m\033[34m"
```

5.22.1.4 BOLDGREEN

```
#define BOLDGREEN "\033[1m\033[32m"
```

5.22.1.5 BOLDRED

```
#define BOLDRED "\033[1m\033[31m"
```

5.22.1.6 BOLDYELLOW

```
#define BOLDYELLOW "\033[1m\033[33m"
```

5.22.1.7 CLEARALL

```
#define CLEARALL "\033[2J"
```

5.22.1.8 CLEARLINE

```
#define CLEARLINE "\033[K"
```

5.22.1.9 G0

```
#define G0 6.67408e-3
```

5.22.1.10 MAX

```
#define MAX(  
    a,  
    b ) (a>b?a:b)
```

5.22.1.11 MIN

```
#define MIN(  
    a,  
    b ) (a<b?a:b)
```

5.22.1.12 MOVEDOWN

```
#define MOVEDOWN(  
    x ) printf("\033[%dB", (x))
```

5.22.1.13 MOVELEFT

```
#define MOVELEFT(  
    x ) printf("\033[%dD", (x))
```

5.22.1.14 MOVERIGHT

```
#define MOVERIGHT(  
    x ) printf("\033[%dC", (x))
```

5.22.1.15 MOVETO

```
#define MOVETO(  
    y,  
    x ) printf("\033[%d;%dH", (y), (x))
```

5.22.1.16 MOVEUP

```
#define MOVEUP(  
    x ) printf("\033[%dA", (x))
```

5.22.1.17 Pi

```
#define Pi (4.0*atan(1.0))
```

5.22.1.18 PRECISION

```
#define PRECISION 16
```

5.22.1.19 RESET

```
#define RESET "\033[0m"
```

5.22.1.20 SetToBox

```
#define SetToBox(  
    a,  
    b,  
    in ) (MAX(a,MIN(b,in)))
```

5.22.1.21 T0

```
#define T0 5.0e+4
```

5.22.1.22 UNDERLINE

```
#define UNDERLINE "\033[1m\033[4m"
```

5.22.1.23 ZERO

```
#define ZERO 1e-16
```

5.22.2 Typedef Documentation

5.22.2.1 _1dArray

```
typedef vector<double> _1dArray
```

5.22.2.2 _1iArray

```
typedef vector<int> _1iArray
```

5.22.2.3 _1sArray

```
typedef vector<string> _1sArray
```

5.22.2.4 _2dArray

```
typedef vector<vector<double> > _2dArray
```

5.22.2.5 _2iArray

```
typedef vector<vector<int> > _2iArray
```

5.22.2.6 _int2intMap

```
typedef map<int,int> _int2intMap
```

5.22.2.7 _str2pointMap

```
typedef map<string,cpoint> _str2pointMap
```

5.22.2.8 cpointArray

```
typedef vector<cpoint> cpointArray
```

5.22.2.9 cubeArray

```
typedef vector<cube> cubeArray
```

5.22.2.10 modelistArray

```
typedef vector<modelist> modelistArray
```

5.22.2.11 obspointArray

```
typedef vector<obspoint> obspointArray
```

5.22.3 Function Documentation

5.22.3.1 arctg()

```
double arctg (
    double )
```

5.22.3.2 cpoint_id()

```
string cpoint_id (
    cpoint )
```

5.22.3.3 grid_interpolate()

```
double grid_interpolate (
    double ,
    double ,
    double ,
    double ,
    double ,
    double ,
    double ,
    double ,
    double ,
    double ,
    double )
```

5.22.3.4 modCpoint()

```
double modCpoint (
    cpoint )
```

5.22.3.5 open_infile()

```
int open_infile (
    ifstream & ,
    char * )
```

5.22.3.6 open_outfile()

```
int open_outfile (
    ostream & ,
    char * )
```

5.22.3.7 operator -()

```
cpoint operator - (
    cpoint ,
    cpoint )
```

5.22.3.8 str2ss()

```
stringstream str2ss (
    string )
```

5.23 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/init_obs.cpp File Reference

```
#include "gm3d.h"
```

5.24 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/main.cpp File Reference

```
#include "gm3d.h"
#include "disp_help.h"
```

Functions

- void [display_help_info](#) (char *program_name)
- int [main](#) (int argc, char *argv[])

5.24.1 Function Documentation

5.24.1.1 display_help_info()

```
void display_help_info (
    char * program_name )
```

5.24.1.2 main()

```
int main (
    int argc,
    char * argv[] )
```

5.25 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_msh_file.cpp File Reference

```
#include "gm3d.h"
```

5.26 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_neighbor_file.cpp File Reference

```
#include "gm3d.h"
```

5.27 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/out_obs.cpp File Reference

```
#include "gm3d.h"
```

5.28 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/progress_bar.cpp File Reference

```
#include "progress_bar.h"
```

5.29 /Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/progress_bar.h File Reference

```
#include <sys/ioctl.h>
#include <iostream>
#include <iomanip>
#include <cstring>
#include <thread>
#include <chrono>
```

Data Structures

- class [ProgressBar](#)

Macros

- `#define TOTAL_PERCENTAGE 100.0`
- `#define CHARACTER_WIDTH_PERCENTAGE 4`

5.29.1 Macro Definition Documentation

5.29.1.1 CHARACTER_WIDTH_PERCENTAGE

```
#define CHARACTER_WIDTH_PERCENTAGE 4
```

5.29.1.2 TOTAL_PERCENTAGE

```
#define TOTAL_PERCENTAGE 100.0
```

5.30 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/read_model.cpp](#) File Reference

```
#include "gm3d.h"
```

5.31 [/Users/zhangyi/Documents/GitHub/Toolbox/gm3d/src/registered_output.cpp](#) File Reference

```
#include "gm3d.h"
```

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