# FLT_HAZ

Generated by Doxygen 1.8.10

Wed Jul 11 2018 09:37:24

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## 2.1 File List

Here is a list of all files with brief descriptions:

# Chapter 3

# Module Documentation

## 3.1 const_module Module Reference

### Variables

- real(8), parameter pi = 3.14159265358979
- real(8), parameter deg2rad = 0.0174532925199433
- real(8), parameter rad2deg = 57.2957795130823
- real(8), parameter sqrt2_inv = 0.707106781186547
- real(8), parameter earth_r = 6371.0
- integer, parameter ss = 1
- integer, parameter rv = 2
- integer, parameter nm = 3
- integer, parameter na = 4
- integer, parameter wc94 = 1
- integer, parameter peer = 2
- integer, parameter ceus = 3
- integer, parameter point = 4
- integer, parameter exponential = 1
- integer, parameter characteristic = 2
- integer, parameter delta = 3
- integer, parameter deg = 1
- integer, parameter km = 2
- integer, parameter sadigh97 = 1
- integer, parameter cy14 = 2
- integer, parameter uniform = 1
- integer, parameter triangular = 2
- integer, parameter normal = 1
- integer, parameter trunc_normal = 2
- integer, parameter heaviside = 3

### 3.1.1 Variable Documentation

#### 3.1.1.1 integer, parameter const_module::ceus = 3

#### 3.1.1.2 integer, parameter const_module::characteristic = 2

#### 3.1.1.3 integer, parameter const_module::cy14 = 2

#### 3.1.1.4 integer, parameter const_module::deg = 1

#### 3.1.1.5 real(8), parameter const_module::deg2rad = 0.0174532925199433

#### 3.1.1.6 integer, parameter const_module::delta = 3

#### 3.1.1.7 real(8), parameter const_module::earth_r = 6371.0

#### 3.1.1.8 integer, parameter const_module::exponential = 1

#### 3.1.1.9 integer, parameter const_module::heaviside = 3

#### 3.1.1.10 integer, parameter const_module::km = 2

#### 3.1.1.11 integer, parameter const_module::na = 4

#### 3.1.1.12 integer, parameter const_module::nm = 3

#### 3.1.1.13 integer, parameter const_module::normal = 1

#### 3.1.1.14 integer, parameter const_module::peer = 2

#### 3.1.1.15 real(8), parameter const_module::pi = 3.14159265358979

#### 3.1.1.16 integer, parameter const_module::point = 4

#### 3.1.1.17 real(8), parameter const_module::rad2deg = 57.2957795130823

#### 3.1.1.18 integer, parameter const_module::rv = 2

#### 3.1.1.19 integer, parameter const_module::sadigh97 = 1

#### 3.1.1.20 real(8), parameter const_module::sqrt2_inv = 0.707106781186547

#### 3.1.1.21 integer, parameter const_module::ss = 1

#### 3.1.1.22 integer, parameter const_module::triangular = 2

#### 3.1.1.23 integer, parameter const_module::trunc_normal = 2

#### 3.1.1.24 integer, parameter const_module::uniform = 1

#### 3.1.1.25 integer, parameter const_module::wc94 = 1

## 3.2 flt_module Module Reference

### Functions/Subroutines

- subroutine mag_freq_distribution ()
- subroutine unit_conversion ()
- subroutine caldepthprob ()
- subroutine deg2km_model ()
- subroutine align_model ()
- subroutine flt_ini ()
- subroutine cal_p_locd_arr ()
- subroutine cal_coor_d ()

- subroutine rupture_location ()
- subroutine locate_rupture (S1_local, S2_local, rup_coor)
- subroutine mw2arup ()

## Variables

- real(8), dimension(:), allocatable flt_len_seg
- real(8), dimension(:), allocatable flt_az_seg
- real(8), dimension(:,:), allocatable flt_coor
- real(8), dimension(:), allocatable flt_s_corner
- real(8), dimension(2) site_coor
- real(8), dimension(:), allocatable rup_top
- real(8), dimension(:,:), allocatable rup_coor
- real(8), dimension(:,:), allocatable coor_d
- real(8), dimension(:), allocatable s1
- real(8), dimension(:), allocatable s2
- real(8), dimension(:), allocatable p_locd_arr
- real(8), dimension(:), allocatable mag_inc_0
- real(8), dimension(:), allocatable rate_inc_0
- real(8), dimension(:), allocatable mag_inc
- real(8), dimension(:), allocatable rate_inc
- real(8) flt_area
- real(8) flt_len
- real(8) flt_wid
- real(8) flt_strike_deg
- real(8) flt_strike_rad
- real(8) step_d
- real(8) step_s
- real(8) step_d_trial
- real(8) step_s_trial
- real(8) rup_len
- real(8) rup_wid
- real(8) rup_area
- real(8) rup_len_trial
- real(8) rup_wid_trial
- real(8) rup_area_trial
- integer n_locd
- integer i_locd
- integer n_locs
- integer i_locs
- integer n_cor
- integer i_seg
- real(8) step_d_v
- real(8) step_d_h
- real(8) step_d_hc
- real(8) step_d_hs
- real(8) p_locs
- real(8) p_locd
- real(8) ftop
- real(8) mw
- real(8) rate
- real(8) rrup
- real(8) rjb
- real(8) rx

- integer i_mag
- integer n_mag
- integer i_mag_bin
- integer i_dist_bin
- integer i_eps_bin
- integer i_freq
- integer i_inten
- real(8) tin

### 3.2.1 Function/Subroutine Documentation

#### 3.2.1.1 subroutine flt_module::align_model ( )

#### 3.2.1.2 subroutine flt_module::cal_coor_d ( )

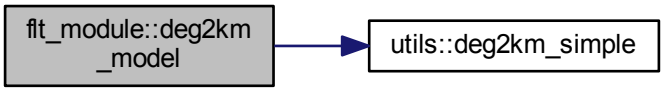
#### 3.2.1.3 subroutine flt_module::cal_p_locd_arr ( )

Here is the call graph for this function:


#### 3.2.1.4 subroutine flt_module::caldepthprob ( )

#### 3.2.1.5 subroutine flt_module::deg2km_model ( )

Here is the call graph for this function:



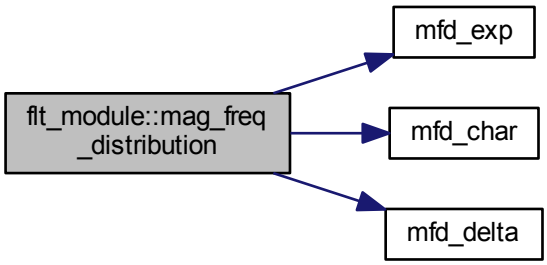
#### 3.2.1.6 subroutine flt_module::flt_ini ( )

Here is the call graph for this function:


#### 3.2.1.7 subroutine flt_module::locate_rupture ( real(8), intent(in) *S1_local,* real(8), intent(in) *S2_local,* real(8), dimension(:,:), intent(out), allocatable *rup_coor* )

#### 3.2.1.8 subroutine flt_module::mag_freq_distribution ( )

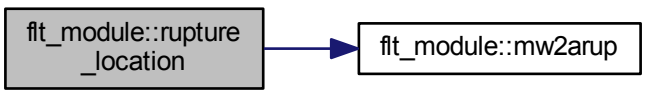
Here is the call graph for this function:




#### 3.2.1.9 subroutine flt_module::mw2arup ( )

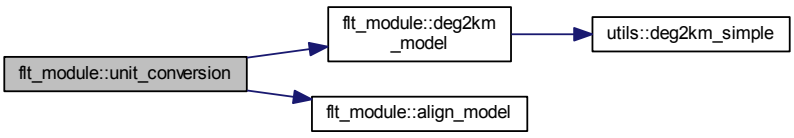
#### 3.2.1.10 subroutine flt_module::rupture_location ( )

Here is the call graph for this function:



#### 3.2.1.11 subroutine flt_module::unit_conversion ( )

Here is the call graph for this function:




### 3.2.2 Variable Documentation

#### 3.2.2.1 real(8), dimension(:,:), allocatable flt_module::coor_d

#### 3.2.2.2 real(8) flt_module::flt_area

#### 3.2.2.3 real(8), dimension(:), allocatable flt_module::flt_az_seg

#### 3.2.2.4 real(8), dimension(:,:), allocatable flt_module::flt_coor

#### 3.2.2.5 real(8) flt_module::flt_len

#### 3.2.2.6 real(8), dimension(:), allocatable flt_module::flt_len_seg

#### 3.2.2.7 real(8), dimension(:), allocatable flt_module::flt_s_corner

#### 3.2.2.8 real(8) flt_module::flt_strike_deg

#### 3.2.2.9 real(8) flt_module::flt_strike_rad

#### 3.2.2.10 real(8) flt_module::flt_wid

#### 3.2.2.11 real(8) flt_module::ftop

#### 3.2.2.12 integer flt_module::i_dist_bin

#### 3.2.2.13 integer flt_module::i_eps_bin

#### 3.2.2.14 integer flt_module::i_freq

#### 3.2.2.15 integer flt_module::i_inten

#### 3.2.2.16 integer flt_module::i_locd

#### 3.2.2.17 integer flt_module::i_locs

#### 3.2.2.18 integer flt_module::i_mag

#### 3.2.2.19 integer flt_module::i_mag_bin

#### 3.2.2.20 integer flt_module::i_seg

3.2.2.21 real(8), dimension(:), allocatable flt_module::mag_inc

3.2.2.22 real(8), dimension(:), allocatable flt_module::mag_inc_0

3.2.2.23 real(8) flt_module::mw

3.2.2.24 integer flt_module::n_cor

3.2.2.25 integer flt_module::n_locd

3.2.2.26 integer flt_module::n_locs

3.2.2.27 integer flt_module::n_mag

3.2.2.28 real(8) flt_module::p_locd

3.2.2.29 real(8), dimension(:), allocatable flt_module::p_locd_arr

3.2.2.30 real(8) flt_module::p_locs

3.2.2.31 real(8) flt_module::rate

3.2.2.32 real(8), dimension(:), allocatable flt_module::rate_inc

3.2.2.33 real(8), dimension(:), allocatable flt_module::rate_inc_0

3.2.2.34 real(8) flt_module::rjb

3.2.2.35 real(8) flt_module::rrup

3.2.2.36 real(8) flt_module::rup_area

3.2.2.37 real(8) flt_module::rup_area_trial

3.2.2.38 real(8), dimension(:,:), allocatable flt_module::rup_coor

3.2.2.39 real(8) flt_module::rup_len

3.2.2.40 real(8) flt_module::rup_len_trial

3.2.2.41 real(8), dimension(:), allocatable flt_module::rup_top

3.2.2.42 real(8) flt_module::rup_wid

3.2.2.43 real(8) flt_module::rup_wid_trial

3.2.2.44 real(8) flt_module::rx

3.2.2.45 real(8), dimension(:), allocatable flt_module::s1

3.2.2.46 real(8), dimension(:), allocatable flt_module::s2

3.2.2.47 real(8), dimension(2) flt_module::site_coor

3.2.2.48 real(8) flt_module::step_d

#### 3.2.2.49 real(8) flt_module::step_d_h

#### 3.2.2.50 real(8) flt_module::step_d_hc

#### 3.2.2.51 real(8) flt_module::step_d_hs

#### 3.2.2.52 real(8) flt_module::step_d_trial

#### 3.2.2.53 real(8) flt_module::step_d_v

#### 3.2.2.54 real(8) flt_module::step_s

#### 3.2.2.55 real(8) flt_module::step_s_trial

#### 3.2.2.56 real(8) flt_module::tin

## 3.3 gmpe_module Module Reference

### Functions/Subroutines

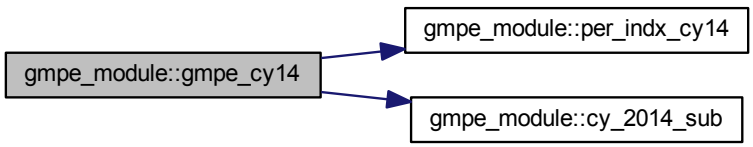
- subroutine gmpe_interface (m_gmpe_name, Tin, Mw, m_sof, Rrup, Rjb, Rx, Ztor, dip, Vs30, Z10, gmpe_↩ params, gmpe_opts, lnSa, Sigma)
- subroutine gmpe_sadigh97 (lnSa, Sigma, M, Rrup, Tin, m_SOF)
- subroutine gmpe_cy14 (M, T, Rrup, Rjb, Rx, Ztor, dip, m_SOF, Z10, Vs30, gmpe_params, gmpe_opts, lnSa, sigma)
- subroutine cy_2014_sub (M, ip, R_RUP, R_JB, Rx, Ztor, delta, F_RV, F_NM, HW, Z10, Vs30, FVS30, region, d_DPP, lnSa, sigma)
- subroutine per_indx_cy14 (per, per_indx)

### 3.3.1 Function/Subroutine Documentation

#### 3.3.1.1 subroutine gmpe_module::cy_2014_sub ( real(8) *M,* integer *ip,* real(8) *R_RUP,* real(8) *R_JB,* real(8) *Rx,* real(8) *Ztor,* real(8) *delta,* integer *F_RV,* integer *F_NM,* real(8) *HW,* real(8) *Z10,* real(8) *Vs30,* integer *FVS30,* integer *region,* real(8) *d_DPP,* real(8) *lnSa,* real(8) *sigma* )

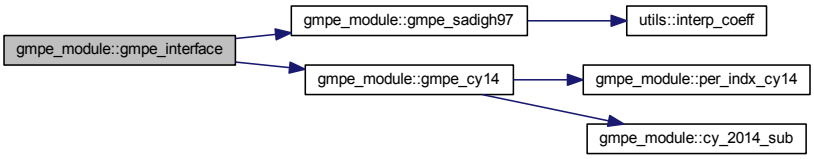
#### 3.3.1.2 subroutine gmpe_module::gmpe_cy14 ( real(8) *M,* real(8) *T,* real(8) *Rrup,* real(8) *Rjb,* real(8) *Rx,* real(8) *Ztor,* real(8) *dip,* integer *m_SOF,* real(8) *Z10,* real(8) *Vs30,* real(8), dimension(:) *gmpe_params,* integer, dimension(:) *gmpe_opts,* real(8) *lnSa,* real(8) *sigma* )

Here is the call graph for this function:



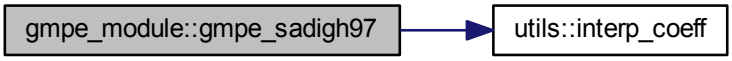
#### 3.3.1.3 subroutine gmpe_module::gmpe_interface ( integer *m_gmpe_name,* real(8) *Tin,* real(8) *Mw,* integer *m_sof,* real(8) *Rrup,* real(8) *Rjb,* real(8) *Rx,* real(8) *Ztor,* real(8) *dip,* real(8) *Vs30,* real(8) *Z10,* real(8), dimension(:), allocatable *gmpe_params,* integer, dimension(:), allocatable *gmpe_opts,* real(8) *lnSa,* real(8) *Sigma* )

Here is the call graph for this function:




#### 3.3.1.4 subroutine gmpe_module::gmpe_sadigh97 ( real(8) *lnSa,* real(8) *Sigma,* real(8) *M,* real(8) *Rrup,* real(8) *Tin,* integer *m_SOF* )

Here is the call graph for this function:




#### 3.3.1.5 subroutine gmpe_module::per_indx_cy14 ( real(8) *per,* integer *per_indx* )

## 3.4 input_module Module Reference

### Functions/Subroutines

- subroutine read_input ()
- subroutine read_site ()
- subroutine read_frequency ()
- subroutine read_fault_trace ()
- subroutine read_rec_relation ()
- subroutine read_slip_rate ()
- subroutine read_b_value ()
- subroutine read_sof ()
- subroutine read_unit ()
- subroutine read_aleatory_distribution ()
- subroutine read_trunc_level ()
- subroutine read_scaling_model
- subroutine read_dip ()
- subroutine read_gmpe_name ()
- subroutine read_vs30 ()

- subroutine read_z10 ()
- subroutine read_z25 ()
- subroutine read_seismogenic_depth ()
- subroutine read_depth_distribution ()
- subroutine read_aspect_ratio ()
- subroutine read_strike_dip_step ()
- subroutine read_mag_range ()
- subroutine read_depth_param ()
- subroutine read_mag_step ()
- subroutine read_intensity ()
- subroutine read_mag_bin ()
- subroutine read_dist_bin ()
- subroutine read_eps_bin ()
- subroutine read_gmpe_params ()
- subroutine read_gmpe_opts ()
- subroutine close_file ()
- subroutine print_haz_bin (haz_bin)
- subroutine print_haz (haz)

## Variables

- integer fp_inp
- integer fp_log
- integer fp_haz
- integer fp_dag
- integer fp_rup
- integer ppos
- logical inp_exist
- character(130) fnm_inp
- character(130) arg
- character(130) fnm_log
- character(130) fnm_haz
- character(130) fnm_dag
- character(130) fnm_rup
- integer eastat
- integer iost
- character(130) line
- character(130) wrt_fmt
- character(130) str_tmp
- character(130) gmpe_name
- character(3) ext_log = 'log'
- character(3) ext_haz = 'haz'
- character(3) ext_dag = 'dag'
- character(3) ext_rup = 'rup'
- real(8), dimension(2) site
- real(8), dimension(:), allocatable frequency
- real(8), dimension(:), allocatable intensity
- real(8), dimension(:), allocatable mag_bin
- real(8), dimension(:), allocatable dist_bin
- real(8), dimension(:), allocatable eps_bin
- real(8), dimension(:,:), allocatable flt_trace
- real(8), dimension(:), allocatable gmpe_params
- integer, dimension(:), allocatable gmpe_opts
- real(8), dimension(500, 2) temp2

- real(8), dimension(500) temp1
- integer, dimension(500) temp_int
- integer tmp_int
- real(8) tmp1
- real(8) tmp2
- integer numvalues
- real(8) slip_rate
- real(8) b_value
- real(8) trunc_level
- real(8) vs30
- real(8) smin
- real(8) smax
- real(8) flt_dip_deg
- real(8) flt_dip_rad
- real(8) aspect_ratio
- real(8) z10
- real(8) z25
- real(8) strike_step
- real(8) dip_step
- real(8) depth_param
- real(8) mag_step
- real(8) mmin
- real(8) mmax
- integer m_sof
- integer m_scaling
- integer m_rec_relation
- integer m_unit
- integer m_sigma_trunc
- integer m_gmpe_name
- integer m_depth_distribution
- integer m_aleatory_distribution
- integer n_freq
- integer n_inten
- integer n_mag_bin
- integer n_dist_bin
- integer n_eps_bin
- integer flt_n_corner
- integer flt_n_seg

### 3.4.1 Function/Subroutine Documentation

#### 3.4.1.1 subroutine input_module::close_file ( )

#### 3.4.1.2 subroutine input_module::print_haz ( real(8), dimension(:,:) *haz* )

#### 3.4.1.3 subroutine input_module::print_haz_bin ( real(8), dimension(:,:,:,:,:) *haz_bin* )

#### 3.4.1.4 subroutine input_module::read_aleatory_distribution ( )

#### 3.4.1.5 subroutine input_module::read_aspect_ratio ( )

#### 3.4.1.6 subroutine input_module::read_b_value ( )

#### 3.4.1.7 subroutine input_module::read_depth_distribution ( )

#### 3.4.1.8 subroutine input_module::read_depth_param ( )

#### 3.4.1.9 subroutine input_module::read_dip ( )

#### 3.4.1.10 subroutine input_module::read_dist_bin ( )

#### 3.4.1.11 subroutine input_module::read_eps_bin ( )

#### 3.4.1.12 subroutine input_module::read_fault_trace ( )

#### 3.4.1.13 subroutine input_module::read_frequency ( )

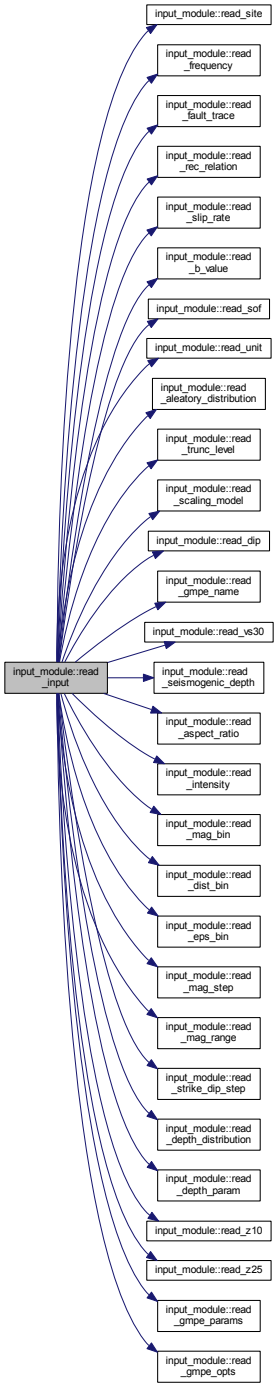
#### 3.4.1.14 subroutine input_module::read_gmpe_name ( )

#### 3.4.1.15 subroutine input_module::read_gmpe_opts ( )

#### 3.4.1.16 subroutine input_module::read_gmpe_params ( )

#### 3.4.1.17 subroutine input_module::read_input ( )

Here is the call graph for this function:




#### 3.4.1.18 subroutine input_module::read_intensity ( )

#### 3.4.1.19 subroutine input_module::read_mag_bin ( )

3.4.1.20 subroutine input_module::read_mag_range ( )

3.4.1.21 subroutine input_module::read_mag_step ( )

3.4.1.22 subroutine input_module::read_rec_relation ( )

3.4.1.23 subroutine input_module::read_scaling_model ( )

3.4.1.24 subroutine input_module::read_seismogenic_depth ( )

3.4.1.25 subroutine input_module::read_site ( )

3.4.1.26 subroutine input_module::read_slip_rate ( )

3.4.1.27 subroutine input_module::read_sof ( )

3.4.1.28 subroutine input_module::read_strike_dip_step ( )

3.4.1.29 subroutine input_module::read_trunc_level ( )

3.4.1.30 subroutine input_module::read_unit ( )

3.4.1.31 subroutine input_module::read_vs30 ( )

3.4.1.32 subroutine input_module::read_z10 ( )

3.4.1.33 subroutine input_module::read_z25 ( )

### 3.4.2 Variable Documentation

3.4.2.1 character(130) input_module::arg

3.4.2.2 real(8) input_module::aspect_ratio

3.4.2.3 real(8) input_module::b_value

3.4.2.4 real(8) input_module::depth_param

3.4.2.5 real(8) input_module::dip_step

3.4.2.6 real(8), dimension(:), allocatable input_module::dist_bin

3.4.2.7 integer input_module::eastat

3.4.2.8 real(8), dimension(:), allocatable input_module::eps_bin

3.4.2.9 character(3) input_module::ext_dag = 'dag'

3.4.2.10 character(3) input_module::ext_haz = 'haz'

3.4.2.11 character(3) input_module::ext_log = 'log'

3.4.2.12 character(3) input_module::ext_rup = 'rup'

3.4.2.13 real(8) input_module::flt_dip_deg

3.4.2.14 real(8) input_module::flt_dip_rad

3.4.2.15 integer input_module::flt_n_corner

3.4.2.16 integer input_module::flt_n_seg

3.4.2.17 real(8), dimension(:,:), allocatable input_module::flt_trace

3.4.2.18 character(130) input_module::fnm_dag

3.4.2.19 character(130) input_module::fnm_haz

3.4.2.20 character(130) input_module::fnm_inp

3.4.2.21 character(130) input_module::fnm_log

3.4.2.22 character(130) input_module::fnm_rup

3.4.2.23 integer input_module::fp_dag

3.4.2.24 integer input_module::fp_haz

3.4.2.25 integer input_module::fp_inp

3.4.2.26 integer input_module::fp_log

3.4.2.27 integer input_module::fp_rup

3.4.2.28 real(8), dimension(:), allocatable input_module::frequency

3.4.2.29 character(130) input_module::gmpe_name

3.4.2.30 integer, dimension(:), allocatable input_module::gmpe_opts

3.4.2.31 real(8), dimension(:), allocatable input_module::gmpe_params

3.4.2.32 logical input_module::inp_exist

3.4.2.33 real(8), dimension(:), allocatable input_module::intensity

3.4.2.34 integer input_module::iost

3.4.2.35 character(130) input_module::line

3.4.2.36 integer input_module::m_aleatory_distribution

3.4.2.37 integer input_module::m_depth_distribution

3.4.2.38 integer input_module::m_gmpe_name

3.4.2.39 integer input_module::m_rec_relation

3.4.2.40 integer input_module::m_scaling

3.4.2.41 integer input_module::m_sigma_trunc

3.4.2.42 integer input_module::m_sof

3.4.2.43 integer input_module::m_unit

3.4.2.44 real(8), dimension(:), allocatable input_module::mag_bin

3.4.2.45 real(8) input_module::mag_step

3.4.2.46 real(8) input_module::mmax

3.4.2.47 real(8) input_module::mmin

3.4.2.48 integer input_module::n_dist_bin

3.4.2.49 integer input_module::n_eps_bin

3.4.2.50 integer input_module::n_freq

3.4.2.51 integer input_module::n_inten

3.4.2.52 integer input_module::n_mag_bin

3.4.2.53 integer input_module::numvalues

3.4.2.54 integer input_module::ppos

3.4.2.55 real(8), dimension(2) input_module::site

3.4.2.56 real(8) input_module::slip_rate

3.4.2.57 real(8) input_module::smax

3.4.2.58 real(8) input_module::smin

3.4.2.59 character(130) input_module::str_tmp

3.4.2.60 real(8) input_module::strike_step

3.4.2.61 real(8), dimension(500) input_module::temp1

3.4.2.62 real(8), dimension(500,2) input_module::temp2

3.4.2.63 integer, dimension(500) input_module::temp_int

3.4.2.64 real(8) input_module::tmp1

3.4.2.65 real(8) input_module::tmp2

3.4.2.66 integer input_module::tmp_int

3.4.2.67 real(8) input_module::trunc_level

3.4.2.68 real(8) input_module::vs30

3.4.2.69 character(130) input_module::wrt_fmt

#### 3.4.2.70 real(8) input_module::z10

#### 3.4.2.71 real(8) input_module::z25

## 3.5 utils Module Reference

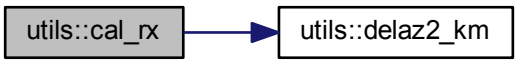
### Functions/Subroutines

- subroutine locate (ibin, edge, x)
- subroutine deg2km_simple (vn, ve, alat_sta, alon_sta, alat_ref, alon_ref)
- subroutine delaz2_km (y1, x1, y2, x2, delta, az)
- elemental real(8) function normcdf (x)
- elemental real(8) function deltacdf (x)
- subroutine truncnormcdf (x, a, b, z)
- double precision function m22det (A)
- double precision function m33det (A)
- subroutine pointlinesegdistance (a, b, x, dist)
- subroutine pointtriangledistance (TRI1, TRI2, TRI3, P, dist)
- real(8) function dot3 (x, y)
- subroutine dist_rup_seg (Rrup, Rjb, Rx, coor, Ztor, strike, dip, rup_wid)
- real(8) function cal_rx (coor)
- subroutine dist_rup_set (Rrup, Rjb, Rx, coor, Ztor, strike, dip, rup_wid)
- subroutine interp_coeff (x1, x2, y1, y2, x, y, iflag)
- subroutine prob_exceed (p_exceed, m_eps, m_aleatory_distribution, trunclevel)

### 3.5.1 Function/Subroutine Documentation

#### 3.5.1.1 real(8) function utils::cal_rx ( real(8), dimension(2,2), intent(in) *coor* )

Here is the call graph for this function:



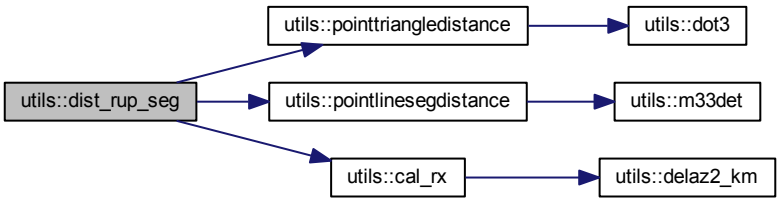

#### 3.5.1.2 subroutine utils::deg2km_simple ( real(8) *vn,* real(8) *ve,* real(8) *alat_sta,* real(8) *alon_sta,* real(8) *alat_ref,* real(8) *alon_ref* )

#### 3.5.1.3 subroutine utils::delaz2_km ( real(8), intent(in) *y1,* real(8), intent(in) *x1,* real(8), intent(in) *y2,* real(8), intent(in) *x2,* real(8), intent(out) *delta,* real(8), intent(out) *az* )

#### 3.5.1.4 elemental real(8) function utils::deltacdf ( real(8), intent(in) *x* )

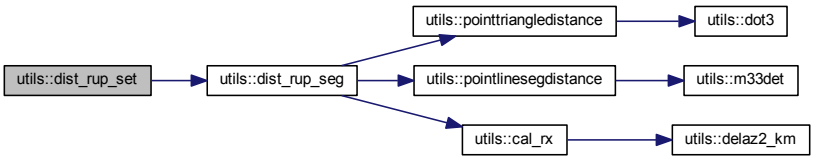
3.5.1.5 subroutine utils::dist_rup_seg ( real(8) *Rrup,* real(8) *Rjb,* real(8) *Rx,* real(8), dimension(2,2) *coor,* real(8) *Ztor,* real(8) *strike,* real(8) *dip,* real(8) *rup_wid* )

Here is the call graph for this function:




3.5.1.6 subroutine utils::dist_rup_set ( real(8) *Rrup,* real(8) *Rjb,* real(8) *Rx,* real(8), dimension(:,:), allocatable *coor,* real(8) *Ztor,* real(8) *strike,* real(8) *dip,* real(8) *rup_wid* )

Here is the call graph for this function:




3.5.1.7 real(8) function utils::dot3 ( real(8), dimension(3) *x,* real(8), dimension(3) *y* )

3.5.1.8 subroutine utils::interp_coeff ( real(8) *x1,* real(8) *x2,* real(8) *y1,* real(8) *y2,* real(8) *x,* real(8) *y,* integer *iflag* )

3.5.1.9 subroutine utils::locate ( integer *ibin,* real(8), dimension(:), allocatable *edge,* real(8) *x* )

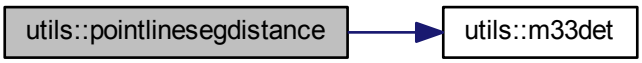
3.5.1.10 double precision function utils::m22det ( double precision, dimension(2,2), intent(in) *A* )

3.5.1.11 double precision function utils::m33det ( double precision, dimension(3,3), intent(in) *A* )

3.5.1.12 elemental real(8) function utils::normcdf ( real(8), intent(in) *x* )

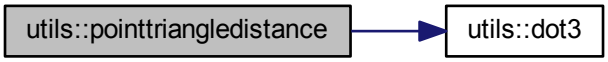
3.5.1.13 subroutine utils::pointlinesegdistance ( real(8), dimension(2) *a,* real(8), dimension(2) *b,* real(8), dimension(2), intent(in) *x,* real(8), intent(out) *dist* )

Here is the call graph for this function:



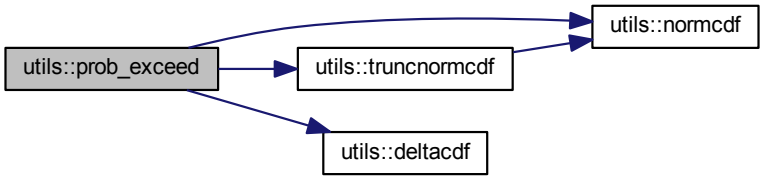

3.5.1.14 subroutine utils::pointtriangledistance ( real(8), dimension(3), intent(in) *TRI1,* real(8), dimension(3), intent(in) *TRI2,* real(8), dimension(3), intent(in) *TRI3,* real(8), dimension(3), intent(in) *P,* real(8), intent(out) *dist* )

Here is the call graph for this function:



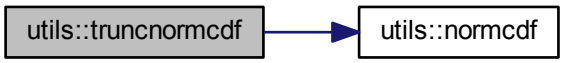

3.5.1.15 subroutine utils::prob_exceed ( real(8) *p_exceed,* real(8) *m_eps,* integer *m_aleatory_distribution,* real(8) *trunclevel* )

Here is the call graph for this function:



#### 3.5.1.16 subroutine utils::truncnormcdf ( real(8), intent(in) *x,* real(8), intent(in) *a,* real(8), intent(in) *b,* real(8), intent(out) *z* )

Here is the call graph for this function:



# Chapter 4

# File Documentation

## 4.1 const_module.f90 File Reference

### Modules

- module const_module

### Variables

- real(8), parameter const_module::pi = 3.14159265358979
- real(8), parameter const_module::deg2rad = 0.0174532925199433
- real(8), parameter const_module::rad2deg = 57.2957795130823
- real(8), parameter const_module::sqrt2_inv = 0.707106781186547
- real(8), parameter const_module::earth_r = 6371.0
- integer, parameter const_module::ss = 1
- integer, parameter const_module::rv = 2
- integer, parameter const_module::nm = 3
- integer, parameter const_module::na = 4
- integer, parameter const_module::wc94 = 1
- integer, parameter const_module::peer = 2
- integer, parameter const_module::ceus = 3
- integer, parameter const_module::point = 4
- integer, parameter const_module::exponential = 1
- integer, parameter const_module::characteristic = 2
- integer, parameter const_module::delta = 3
- integer, parameter const_module::deg = 1
- integer, parameter const_module::km = 2
- integer, parameter const_module::sadigh97 = 1
- integer, parameter const_module::cy14 = 2
- integer, parameter const_module::uniform = 1
- integer, parameter const_module::triangular = 2
- integer, parameter const_module::normal = 1
- integer, parameter const_module::trunc_normal = 2
- integer, parameter const_module::heaviside = 3

## 4.2 flt_module.f90 File Reference

### Modules

- module flt_module

### Functions/Subroutines

- subroutine flt_module::mag_freq_distribution ()
- subroutine mfd_delta ()
- subroutine mfd_exp ()
- subroutine mfd_char ()
- subroutine flt_module::unit_conversion ()
- subroutine flt_module::caldepthprob ()
- subroutine flt_module::deg2km_model ()
- subroutine flt_module::align_model ()
- subroutine flt_module::flt_ini ()
- subroutine flt_module::cal_p_locd_arr ()
- subroutine flt_module::cal_coor_d ()
- subroutine flt_module::rupture_location ()
- subroutine flt_module::locate_rupture (S1_local, S2_local, rup_coor)
- subroutine flt_module::mw2arup ()

### Variables

- real(8), dimension(:), allocatable flt_module::flt_len_seg
- real(8), dimension(:), allocatable flt_module::flt_az_seg
- real(8), dimension(:,:), allocatable flt_module::flt_coor
- real(8), dimension(:), allocatable flt_module::flt_s_corner
- real(8), dimension(2) flt_module::site_coor
- real(8), dimension(:), allocatable flt_module::rup_top
- real(8), dimension(:,:), allocatable flt_module::rup_coor
- real(8), dimension(:,:), allocatable flt_module::coor_d
- real(8), dimension(:), allocatable flt_module::s1
- real(8), dimension(:), allocatable flt_module::s2
- real(8), dimension(:), allocatable flt_module::p_locd_arr
- real(8), dimension(:), allocatable flt_module::mag_inc_0
- real(8), dimension(:), allocatable flt_module::rate_inc_0
- real(8), dimension(:), allocatable flt_module::mag_inc
- real(8), dimension(:), allocatable flt_module::rate_inc
- real(8) flt_module::flt_area
- real(8) flt_module::flt_len
- real(8) flt_module::flt_wid
- real(8) flt_module::flt_strike_deg
- real(8) flt_module::flt_strike_rad
- real(8) flt_module::step_d
- real(8) flt_module::step_s
- real(8) flt_module::step_d_trial
- real(8) flt_module::step_s_trial
- real(8) flt_module::rup_len
- real(8) flt_module::rup_wid
- real(8) flt_module::rup_area
- real(8) flt_module::rup_len_trial
- real(8) flt_module::rup_wid_trial
- real(8) flt_module::rup_area_trial
- integer flt_module::n_locd
- integer flt_module::i_locd
- integer flt_module::n_locs
- integer flt_module::i_locs
- integer flt_module::n_cor

- integer flt_module::i_seg
- real(8) flt_module::step_d_v
- real(8) flt_module::step_d_h
- real(8) flt_module::step_d_hc
- real(8) flt_module::step_d_hs
- real(8) flt_module::p_locs
- real(8) flt_module::p_locd
- real(8) flt_module::ftop
- real(8) flt_module::mw
- real(8) flt_module::rate
- real(8) flt_module::rrup
- real(8) flt_module::rjb
- real(8) flt_module::rx
- integer flt_module::i_mag
- integer flt_module::n_mag
- integer flt_module::i_mag_bin
- integer flt_module::i_dist_bin
- integer flt_module::i_eps_bin
- integer flt_module::i_freq
- integer flt_module::i_inten
- real(8) flt_module::tin

### 4.2.1 Function/Subroutine Documentation

#### 4.2.1.1 subroutine mag_freq_distribution::mfd_char ( )

#### 4.2.1.2 subroutine mag_freq_distribution::mfd_delta ( )

#### 4.2.1.3 subroutine mag_freq_distribution::mfd_exp ( )

## 4.3 GMPE_module.f90 File Reference

### Modules

- module gmpe_module

### Functions/Subroutines

- subroutine gmpe_module::gmpe_interface (m_gmpe_name, Tin, Mw, m_sof, Rrup, Rjb, Rx, Ztor, dip, Vs30, Z10, gmpe_params, gmpe_opts, lnSa, Sigma)
- subroutine gmpe_module::gmpe_sadigh97 (lnSa, Sigma, M, Rrup, Tin, m_SOF)
- subroutine gmpe_module::gmpe_cy14 (M, T, Rrup, Rjb, Rx, Ztor, dip, m_SOF, Z10, Vs30, gmpe_params, gmpe_opts, lnSa, sigma)
- subroutine gmpe_module::cy_2014_sub (M, ip, R_RUP, R_JB, Rx, Ztor, delta, F_RV, F_NM, HW, Z10, Vs30, FVS30, region, d_DPP, lnSa, sigma)
- subroutine gmpe_module::per_indx_cy14 (per, per_indx)

## 4.4 input_module.f90 File Reference

### Modules

- module input_module

## Functions/Subroutines

- subroutine input_module::read_input ()
- subroutine input_module::read_site ()
- subroutine input_module::read_frequency ()
- subroutine input_module::read_fault_trace ()
- subroutine input_module::read_rec_relation ()
- subroutine input_module::read_slip_rate ()
- subroutine input_module::read_b_value ()
- subroutine input_module::read_sof ()
- subroutine input_module::read_unit ()
- subroutine input_module::read_aleatory_distribution ()
- subroutine input_module::read_trunc_level ()
- subroutine input_module::read_scaling_model
- subroutine input_module::read_dip ()
- subroutine input_module::read_gmpe_name ()
- subroutine input_module::read_vs30 ()
- subroutine input_module::read_z10 ()
- subroutine input_module::read_z25 ()
- subroutine input_module::read_seismogenic_depth ()
- subroutine input_module::read_depth_distribution ()
- subroutine input_module::read_aspect_ratio ()
- subroutine input_module::read_strike_dip_step ()
- subroutine input_module::read_mag_range ()
- subroutine input_module::read_depth_param ()
- subroutine input_module::read_mag_step ()
- subroutine input_module::read_intensity ()
- subroutine input_module::read_mag_bin ()
- subroutine input_module::read_dist_bin ()
- subroutine input_module::read_eps_bin ()
- subroutine input_module::read_gmpe_params ()
- subroutine input_module::read_gmpe_opts ()
- subroutine input_module::close_file ()
- subroutine input_module::print_haz_bin (haz_bin)
- subroutine input_module::print_haz (haz)

## Variables

- integer input_module::fp_inp
- integer input_module::fp_log
- integer input_module::fp_haz
- integer input_module::fp_dag
- integer input_module::fp_rup
- integer input_module::ppos
- logical input_module::inp_exist
- character(130) input_module::fnm_inp
- character(130) input_module::arg
- character(130) input_module::fnm_log
- character(130) input_module::fnm_haz
- character(130) input_module::fnm_dag
- character(130) input_module::fnm_rup
- integer input_module::eastat
- integer input_module::iost
- character(130) input_module::line

- character(130) input_module::wrt_fmt
- character(130) input_module::str_tmp
- character(130) input_module::gmpe_name
- character(3) input_module::ext_log = 'log'
- character(3) input_module::ext_haz = 'haz'
- character(3) input_module::ext_dag = 'dag'
- character(3) input_module::ext_rup = 'rup'
- real(8), dimension(2) input_module::site
- real(8), dimension(:), allocatable input_module::frequency
- real(8), dimension(:), allocatable input_module::intensity
- real(8), dimension(:), allocatable input_module::mag_bin
- real(8), dimension(:), allocatable input_module::dist_bin
- real(8), dimension(:), allocatable input_module::eps_bin
- real(8), dimension(:,:), allocatable input_module::flt_trace
- real(8), dimension(:), allocatable input_module::gmpe_params
- integer, dimension(:), allocatable input_module::gmpe_opts
- real(8), dimension(500, 2) input_module::temp2
- real(8), dimension(500) input_module::temp1
- integer, dimension(500) input_module::temp_int
- integer input_module::tmp_int
- real(8) input_module::tmp1
- real(8) input_module::tmp2
- integer input_module::numvalues
- real(8) input_module::slip_rate
- real(8) input_module::b_value
- real(8) input_module::trunc_level
- real(8) input_module::vs30
- real(8) input_module::smin
- real(8) input_module::smax
- real(8) input_module::flt_dip_deg
- real(8) input_module::flt_dip_rad
- real(8) input_module::aspect_ratio
- real(8) input_module::z10
- real(8) input_module::z25
- real(8) input_module::strike_step
- real(8) input_module::dip_step
- real(8) input_module::depth_param
- real(8) input_module::mag_step
- real(8) input_module::mmin
- real(8) input_module::mmax
- integer input_module::m_sof
- integer input_module::m_scaling
- integer input_module::m_rec_relation
- integer input_module::m_unit
- integer input_module::m_sigma_trunc
- integer input_module::m_gmpe_name
- integer input_module::m_depth_distribution
- integer input_module::m_aleatory_distribution
- integer input_module::n_freq
- integer input_module::n_inten
- integer input_module::n_mag_bin
- integer input_module::n_dist_bin
- integer input_module::n_eps_bin
- integer input_module::flt_n_corner
- integer input_module::flt_n_seg

## 4.5 main_flt_haz.f90 File Reference

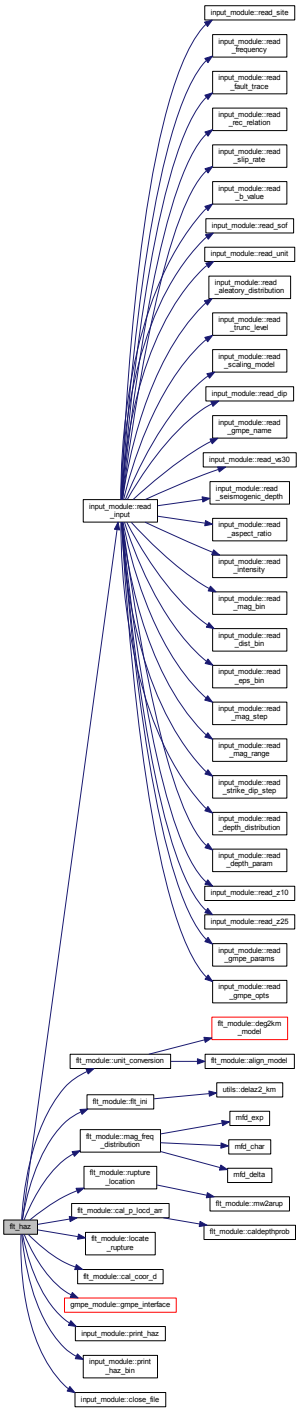
### Functions/Subroutines

- program flt_haz

### 4.5.1 Function/Subroutine Documentation

#### 4.5.1.1 program flt_haz ( )

Here is the call graph for this function:




## 4.6 utils.f90 File Reference

### Modules

- module utils

## Functions/Subroutines

- subroutine utils::locate (ibin, edge, x)
- subroutine utils::deg2km_simple (vn, ve, alat_sta, alon_sta, alat_ref, alon_ref)
- subroutine utils::delaz2_km (y1, x1, y2, x2, delta, az)
- elemental real(8) function utils::normcdf (x)
- elemental real(8) function utils::deltacdf (x)
- subroutine utils::truncnormcdf (x, a, b, z)
- double precision function utils::m22det (A)
- double precision function utils::m33det (A)
- subroutine utils::pointlinesegdistance (a, b, x, dist)
- subroutine utils::pointtriangledistance (TRI1, TRI2, TRI3, P, dist)
- real(8) function utils::dot3 (x, y)
- subroutine utils::dist_rup_seg (Rrup, Rjb, Rx, coor, Ztor, strike, dip, rup_wid)
- real(8) function utils::cal_rx (coor)
- subroutine utils::dist_rup_set (Rrup, Rjb, Rx, coor, Ztor, strike, dip, rup_wid)
- subroutine utils::interp_coeff (x1, x2, y1, y2, x, y, iflag)
- subroutine utils::prob_exceed (p_exceed, m_eps, m_aleatory_distribution, trunclevel)

# Index