C interfaces to GALAHAD FIT

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Chapter 1

GALAHAD C package fit

1.1 Introduction

1.1.1 Purpose

Fit polynomials to function and derivative data.

Currently, only the control and inform parameters are exposed; these are provided and used by other GALAHAD packages with C interfaces.

1.1.2 Authors

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C interface, additionally J. Fowkes, STFC-Rutherford Appleton Laboratory.

Julia interface, additionally A. Montoison and D. Orban, Polytechnique Montréal.

1.1.3 Originally released

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Chapter 2

File Index

2.1 File List

Here is a list of all files with brief descriptions:

Chapter 3

File Documentation

3.1 galahad_fit.h File Reference

```
#include <stdbool.h>
#include <stdint.h>
#include "galahad_precision.h"
#include "galahad_cfunctions.h"
```

Data Structures

- struct fit_control_type
- struct fit_inform_type

Functions

- void fit_initialize (void **data, struct fit_control_type *control, int *status)
- void fit_information (void **data, struct fit_inform_type *inform, int *status)
- void fit_terminate (void **data, struct fit_control_type *control, struct fit_inform_type *inform)

3.1.1 Data Structure Documentation

3.1.1.1 struct fit_control_type

control derived type as a C struct

Data Fields

bool	f_indexing	use C or Fortran sparse matrix indexing
int	error	error and warning diagnostics occur on stream error
int	out	general output occurs on stream out
int	print_level	the level of output required is specified by print_level
bool	space_critical	if space_critical is true, every effort will be made to use as little space as possible. This may result in longer computation times
bool	deallocate_error_fatal	if deallocate_error_fatal is true, any array/pointer deallocation error will terminate execution. Otherwise, computation will continue
char	prefix[31]	all output lines will be prefixed by .prefix(2:LEN(TRIM(.prefix))-1) where .prefix contains the required string enclosed in quotes, e.g. "string" or 'string'

3.1.1.2 struct fit_inform_type

inform derived type as a C struct

Data Fields

int	status	return status. Possible values are: • 0 Normal termination with the required fit. • -1. An allocation error occurred. A message indicating the offending array is written on unit control.error, and the returned allocation status and a string containing the name of the offending array are held in inform.alloc_status and inform.bad_alloc respectively. • -2. A deallocation error occurred. A message indicating the offending array is written on unit control.error and the returned allocation status and a string containing the name of the offending array are held in inform.alloc_status and inform.bad_alloc respectively. • -3. the restriction n >= 1 has been violated.
int	alloc_status	the status of the last attempted allocation/deallocation.
char	bad_alloc[81]	the name of the array for which an allocation/deallocation error occurred.

3.1.2 Function Documentation

3.1.2.1 fit_initialize()

```
void fit_initialize (
             void ** data,
             struct fit_control_type * control,
             int * status )
```

Set default control values and initialize private data

Parameters

in,out	*data*	holds private internal data
out	*control*	is a struct containing control information (see fit_control_type)
out	*status*	is a scalar variable of type int, that gives the exit status from the package. Possible values are (currently): • 0. The initialization was succesful.

3.1.2.2 fit_information()

```
void fit_information (
```

```
            void ** data,
            struct fit_inform_type * inform,
            int * status )
```

Provides output information

Parameters

in,out	*data*	holds private internal data
out	*inform*	is a struct containing output information (see fit_inform_type)
out	*status*	is a scalar variable of type int, that gives the exit status from the package. Possible values are (currently): • 0. The values were recorded succesfully

3.1.2.3 fit_terminate()

```
void fit_terminate (
            void ** data,
            struct fit_control_type * control,
            struct fit_inform_type * inform )
```

Deallocate all internal private storage

Parameters

in,out	*data*	holds private internal data
out	*control*	is a struct containing control information (see fit_control_type)
out	*inform*	is a struct containing output information (see fit_inform_type)