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   Help
#if defined(PremiaCurrentVersion) && PremiaCurrentVersion <
     (2008+2) //The "#else" part of the code will be freely av
    ailable after the (year of creation of this file + 2)
#else
/*************************************************************
*   CPS - A simple C PDE solver                              *
*                                                            *
*   Copyright (c) 2007,                                      *
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*                                                            *

*************************************************************/
#include "cps_stencil.h"
#include "cps_stencil_pattern.h"
#include "cps_utils.h"
#include "cps_assertions.h"
#include "cps_types.h"

/* private functions */

/* public interface functions */

int stencil_create(stencil **s){

  STANDARD_CREATE(s,stencil);
  (*s)->factor = 0.0;
  (*s)->function_factor = NULL;
  stencil_set_weight((*s),TIME_CUR,MODE_IMP,0.0);
  stencil_set_weight((*s),TIME_CUR,MODE_EXP,0.0);
  stencil_set_weight((*s),TIME_NXT,MODE_IMP,0.0);
  stencil_set_weight((*s),TIME_NXT,MODE_EXP,0.0);
  return OK;
}

int stencil_destroy(stencil **s){
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  STANDARD_DESTROY(s);
  return OK;
}

int stencil_set_factor(stencil *s, double fact){
  /* set constant factor */
  REQUIRE("stencil_not_null", s != NULL);

  s->factor = fact;
  return OK;
}

int stencil_set_function_factor(stencil *s, const function
    *f){
  /* set function factor for given stencil */
  REQUIRE("stencil_not_null", s != NULL);
  REQUIRE("function_not_null", f != NULL);

  s->function_factor = f;
  return OK;
}

int stencil_set_value(stencil *s, int space, double val){
  /* set a coefficient in given space position */
  REQUIRE("stencil_not_null",s != NULL);
  REQUIRE("valid_space_position", space >= XY && space <
    MAX_STENCIL_SIZE);

  s->value[space] = val;
  return OK;
}

int stencil_set_weight(stencil *s, int time, int mode,
    double w){
  /* set weight for given mode */
  REQUIRE("stencil_not_null",s != NULL);
  REQUIRE("valid_time", time == TIME_CUR || time == TIME_N
    XT);
  REQUIRE("valid_mode", mode == MODE_EXP || mode == MODE_
    IMP);
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  s->weight[time][mode] = w;

  ENSURE("weight_set", s->weight[time][mode] == w);
  return OK;
}

int stencil_apply(stencil *s, const grid *grid, int time,
    int mode, const grid_node *node, stencil_pattern **sptrn){
    grid_node *neigh;
  stencil_application *sapp;
  int pos;
  double value;

  /* apply a stencil centered in node */
  REQUIRE("stencil_not_null",s != NULL);
  REQUIRE("grid_not_null", grid != NULL);
  REQUIRE("grid_node_not_null", node != NULL);
  REQUIRE("valid_time", time == TIME_CUR || time == TIME_N
    XT);
  REQUIRE("valid_mode", mode == MODE_EXP || mode == MODE_
    IMP);


  stencil_pattern_create(sptrn);

  for(pos = XY; pos <= XPYP; pos++){
    grid_node_neighbour(grid, pos, node, &neigh);
    stencil_evaluate(s, time, mode, pos, node, &value);
    if(value != 0.0){
      stencil_application_create(&sapp);
      sapp->value = value;
      sapp->position = pos;
      if(grid_node_is_boundary(neigh)){
        stencil_application_set_boundary(sapp);
        stencil_application_set_order(sapp,0);
      }
      else if(grid_node_is_external(neigh)){
        stencil_application_set_external(sapp);
        stencil_application_set_order(sapp,0);
      }
      else if(grid_node_is_internal(neigh)){
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        stencil_application_set_internal(sapp);
        stencil_application_set_order(sapp, neigh->orde
    r);
      }
      stencil_pattern_put((*sptrn), pos, sapp);
    }
    grid_node_destroy(&neigh);
  }

  ENSURE("stencil_pattern_created", (*sptrn) != NULL);
  return OK;
}

int stencil_evaluate(stencil *s, int time, int mode, int s_
    pos, const grid_node *node, double *result){
  /* evaluate stencil on given node */
  REQUIRE("stencil_not_null",s != NULL);
  REQUIRE("valid_position", s_pos >= XY && s_pos <= XPYP);
  REQUIRE("valid_time", time == TIME_CUR || time == TIME_N
    XT);
  REQUIRE("valid_mode", mode == MODE_EXP || mode == MODE_
    IMP);

  if(s->value[s_pos] != 0.0){
    *result = s->weight[time][mode] * s->factor
      *  cps_function_evaluate(s->function_factor, nod
    e) * s->value[s_pos];
  }
  else{
    *result = 0.0;
  }
  return OK;
}
/* end -- stencil.c */

#endif //PremiaCurrentVersion
```

References