

ELLSOR

Joan Masso

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Abstract

ELLSOR provides 3D elliptic solvers for the various classes of elliptic problems defined in `EllBase`. ELLSOR is based on the successive over relaxation algorithm. It is called by the interfaces provided in `EllBase`.

1 Purpose

The purpose of this thorn is to provide a simple and straightforward 3D elliptic solver: not to be used by production but to demonstrate key features of the elliptic infrastructure.

This thorn provides

1. No Pizza
2. No Wine
3. peace

2 Technical Details

This thorn supports three elliptic problem classes: **LinFlat** for a standard 3D cartesian Laplace operator, using the standard 7-point computational molecule. **LinMetric** for a Laplace operator derived from the metric, using 19-point stencil. **LinConfMetric** for a Laplace operator derived from the metric and a conformal factor, using a 19-point stencil. The code of the solvers differs for the classes and is explained in the following section.

In general, a stencil variable needs to be set for each of the direction relative to the central gridpoint. These variables are called `ac`, `ae`, `aw`, `an`, `as`, `at`, `ab`, `ane`, `anw`, `ase`, `asw`, `ate`, `atw`, `abe`, `abw`, `atn`, `ats`, `abn`, `asb`, where “`ac`” = a-central, “`t`” = top, “`b`” = bottom, “`n,s,w,e`” = north, south, west, east

2.1 LinFlat

For this class we employ the the 7-point stencil based on `at,ab`, `aw`, `ae`, `an`, `as` only. These values are constant at each gridpoint.

2.2 LinMetric

For this class the standard 19-point stencil is initialized, taken the underlying metric into account. The values for the stencil function differ at each gridpoints.

2.3 LinConfMetric

For this class the standard 19-point stencil is initialized, taken the underlying metric and its conformal factor into account. The values for the stencil function differ at each gridpoints.

3 Comments

The sizes of the arrays `Mlinear` for the coefficient matrix and `Nsource` are passed in the solver. A storage flag is set if these variables are of a sized greater 1. In this case, the array can be accessed.