

amatos Changes from Version 1.1 to 1.2

Enhancements

1. `grid_getinfo`: now, several arrays can be retrieved in one single call. Even a mixture of node and element data is possible. Please omit the specification of `i_arrlen` in this case.
2. `grid_getinfo` can also be used to gather information on selected items, specified in an index list. This feature is useful for gathering information for new items only (see enhancement 5.).
3. Grid index-arrays for fine grid items can now be used in all time levels (in older versions this could be done only in the new time level).
4. The calculation of intersections of arbitrary polygons/triangles with the grid has been added. This calculation uses the `gpc` library by Alan Murta (<http://www.cs.man.ac.uk/aig/staff/alan/software/>). The corresponding routine is called `grid_polygridintersect`.
5. One can retrieve only new items from the grid, now. This is important, when implementing adaptive time-dependent schemes. In the inner iteration, only updates to new items are necessary. This functionality is provided by `grid_newitems`.
6. `grid_coordvalue` now supports radial basis function interpolation. This type of interpolation has been shown to be superior to bi-cubic spline interpolation in many cases. This interpolation type requires LAPACK routines for the solution of a (small) linear system of equations for each interpolation point. For systems without LAPACK installed an “poor man’s LAPACK” is provided in the `lib` directory.
7. A new routine, `grid_coordgradient`, estimates the gradient at a specified position.

Bug Fixes

1. Grid index-arrays were deleted in older versions by `grid_sweep`, if grid was shrunk during one time-step. This caused unpredictable segmentation faults in later calculations! Index-arrays are now packed only if this is possible in all time-levels.
2. A bug in `grid_coordvalue` that occurred when a requested coordinate was outside of the domain has been fixed.

Optimizations

1. `In_out` has been optimized for numerical accuracy: We use barycentric coordinates or a calculation of the triangle area in order to determine, if a given point is inside or outside of the triangle. Area calculation is a bit more computational intense but much more stable in the plain geometry case (therefore it is used in this case).
2. Edge intersection has been optimized by Natalja Rakowsky.
3. Calculation of relative index numbers in `grid_getinfo` has been optimized with an auxiliary index array by Natalja Rakowsky.