

Modifications to `stitch.f` in NIMROD for VDE Simulation

NIMROD Team Meeting October 2014

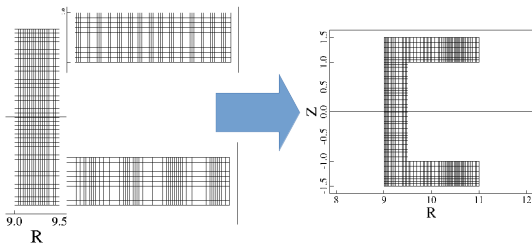
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Stitch Combines multiple meshes into a single mesh.

- Given multiple `nimrod.in` files, `stitch` can read in and create a mesh combining the regions.



Taking three regions and combining into a single mesh.

Vertical displacement event (VDE) calculations with a resistive wall were implemented with external vacuum regions.

- These external vacuum regions surround the interior plasma region.
- External region creation is made simple with `stitch`.
- When adding coils to control VDE, the equilibrium must be recalculated. This calculation in `nimeq` is easiest when taking advantage of up-down symmetry initially. `Stitch` can be used to put together the bottom and top of the equilibria.

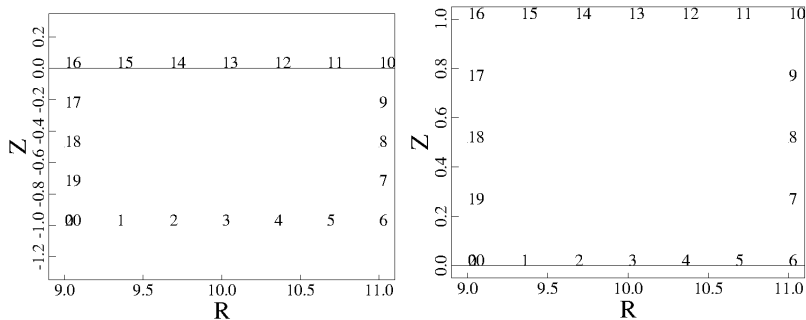
Stitch had limitations.

- `Stitch` only read the `nimrod.in` files. It could not read in equilibria and meshes from dump files.
- `Stitch` did not work on polar grids.
- `Stitch` could not combine multiple regions together if they formed a mesh topologically equivalent to a torus.



You could not do this with `stitch`.

A simple example of using Stitch.



Left: Bottom mesh to stitch.

Right: Top mesh to stitch.

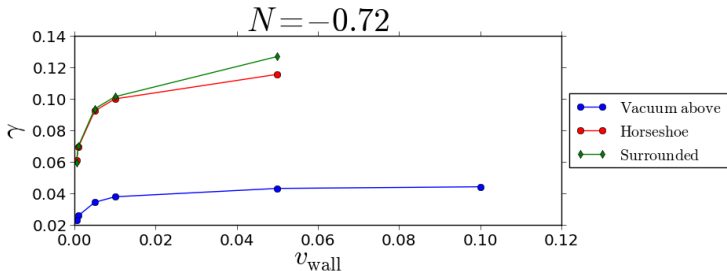
- There are 7 vertices to stitch, starting with top region vertex 0, and bottom region vertex 16.

Stitch was modified to remove these limitations.

- Dump file reading was implemented using existing `nimrod` code.
- Stitching annular regions required more code modifications.
 - Required recognition of all the possibilities for every vertex in the seam.
 - Every vertex is either
 - Currently in the global seam0.
 - In a stitched region (so not in the future global seam0).
 - Not in the current global seam0 and not in the stitch
 - Cartesian and polar grids should now be able to be stitched together in general for any number of regions.
- Stitching now should work for regions with arbitrarily many “holes” .

A completely surrounding external region is nearly equivalent to the external region surrounding three sides.

- The high-field side vacuum region has a small contribution to the growth rate.



Comparison of different geometries.