AUGUSTUS: Unstructured Quadrilateral Mesh Diffusion

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Preliminary Results

- Code runs!
- No preconditioning yet
- Tested against unstructured *format* meshes
- Tested on small systems
- BC's: L-source, R-vacuum, T- and B-reflective.
- No sources, infinite time step

Results Details

- Comparison of matrix values
  - 2 X 2 orthogonal mesh agrees (16 unknowns, reduces to a 5-point)
  - 2 X 2 random mesh agrees (16 unknowns, full 7-point stencil)
  - BC's checked: vacuum, reflective, source
- Solution values - Agree with the exact solution for all cases tested
- Iterations
  - Random 2 X 2, 20 vectors, no scaling: 16 iterations
  - Random 2 X 2, 20 vectors, scaling: 14 iterations

  - Random 10 X 10, 20 vectors, no scaling: 226 iterations
  - Random 10 X 10, 20 vectors, scaling: 130 iterations

  - Kershaw 10 X 10, 20 vectors, no scaling: 483 iterations
  - Kershaw 10 X 10, 20 vectors, scaling: 191 iterations

  - Shestakov 8 X 8, 20 vectors, scaling: >10000 iterations
  - Shestakov 8 X 8, 30 vectors, scaling: >10000 iterations
  - Shestakov 8 X 8, 40 vectors, scaling: 794 iterations

Conclusions

- Good agreement
- Really need preconditioner — next on list
- Could use some actual unstructured meshes for testing
- Possibly get them from NGP