GPU accelerated adaptive wave propagation algorithm

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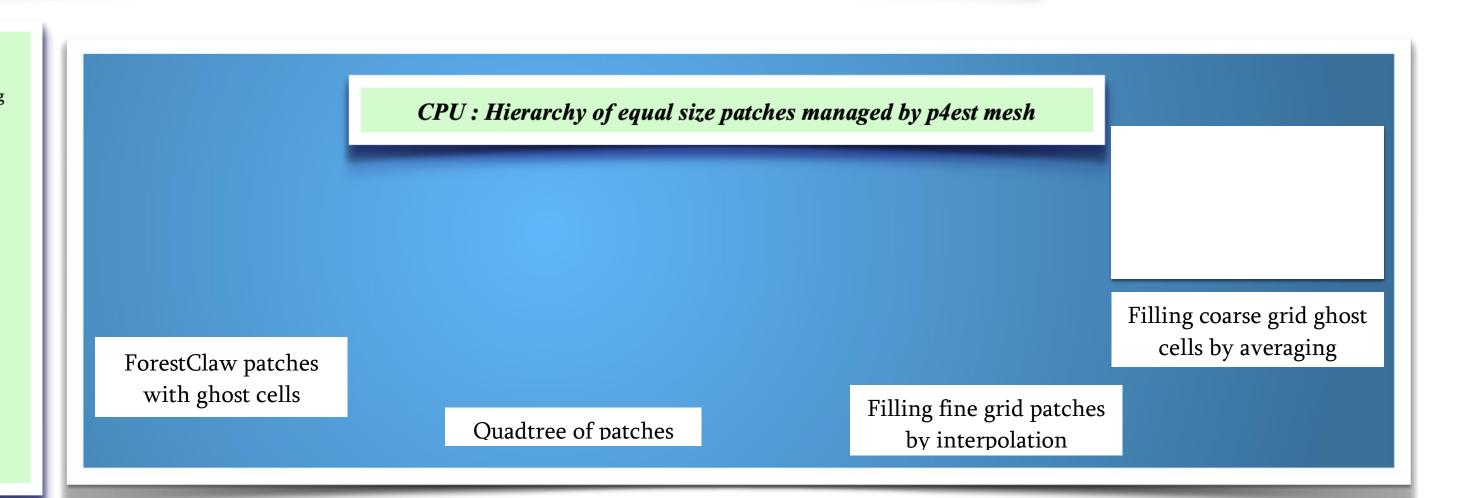
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Key features of ForestClaw

ForestClaw is a parallel, multi-block library for solving PDEs on adaptively refined logically Cartesian meshes.

Some of the features of ForestClaw are:

- Based on the **highly scalable** grid management library p4est (<u>www.p4est.org</u>)
- 2. **Multi-block** capabilities extends the usefulness of Cartesian mesh methods to many important domains, including the cubed sphere, and non-square rectangular regions.
- 3. **Quad-tree** adaptive meshing means that less metadata is stored on each processor, and nearestneighbors are easy to find.
- 4. Cartesian grid layout of each patch and regular neighbor patterns **greatly simplifies the development of novel numerical methods**.
- 5. **ForestClaw** has been extended by several popular libraries, such as **Clawpack** and **GeoClaw** (www.clawpack.org).



GPU: Explicit single time step done in parallel via GPU threads

```
block_size = 128; batch_size = 4000;
mwork = 9*meqn + 9*maux + mwaves + meqn*mwaves;
bytes_per_thread = sizeof(double)*mwork;
bytes = bytes_per_thread*block_size;

dim3 block(block_size,1,1);
dim3 grid(1,1,batch_size);
claw_flux2<<<grid,block,bytes>>>(mx,my,meqn,..)
```

dim3 grid(1,1,batch_size);

Single thread block reused per patch.
Warp of 32 threads run simultaneously

