M3D-C1 ZOOM Meeting

6/15/2020

Agenda

1. Announcements
2. CS Issues
    1. 3D Seg fault on eddy
    2. Local installations
    3. Status of new PPPL/PU computer
    4. Test of pskip and nskip
    5. NERSC Time
    6. Changes to GIT master since last meeting
    7. Error in parallel thermal conductivity
3. Physics Studies
    1. Lyons – current spike during disruption
    2. 2D ITER VDE with new structure
    3. Runaways with sources
    4. M3D-C1 coupling to KORC
    5. Other

Announcements

- Laboratory closed until June 22 (at least)
- No more partition=greene at PPPL
  - Instead use #SLURM –partition=m3dc1 (job will run on greene, 8 GB/core)
- CTTS Talk Series
  - 6/17 Charlson Kim Parameter Scan of NIMROD SPI Simulations
  - 6/24 open
- All talks posted on ctts.pppl.gov
- IAEA Technical Meeting on Disruptions and their mitigation
  - Will be held remotely 20-23 July
  - Clauser, Jardin, Lyons, Strauss, Chen to present talks
  - Talks are to be pre-recorded 1 week in advance: (4:3) or (16:9)
- SciDAC PI meeting scheduled for July 28-30 July 2020 is *cancelled*
  - Replaced by a half-day remote panel session on July 29
  - Need to register….information will follow

Invited (25 min)

3D Seg Fault

When running the 3D code, I have gotten a Segmentation Violation at seemingly random time steps. When I resubmit, it either runs ok or fails at the same place but at a different timestep. The last lines of output when it fails are always the same:

```
 Advancing Temperature--end
  Advancing Fields
       -- Reuse Preconditioner
[70]PETSC ERROR: ----------------
```

This happened to me using SuperLU_dist on cori_knl, and also using mumps on eddy. Because this is not reproducible it will be hard to find, but it could have something to do with changes you made to allow reusing the preconditioner.

Jin: on eddy, copy
/home/jinchen/SRC/M3DC1/unstructured/eddy.mk

Jin Chen

Local Installations

- Portal
  - Still HDF5 problem?
- CENTOS-7 on greene
  - Reg tests?
- MARCONI in Italy
  - Where?
  - For who?

Status of New PPPL/PU Computer

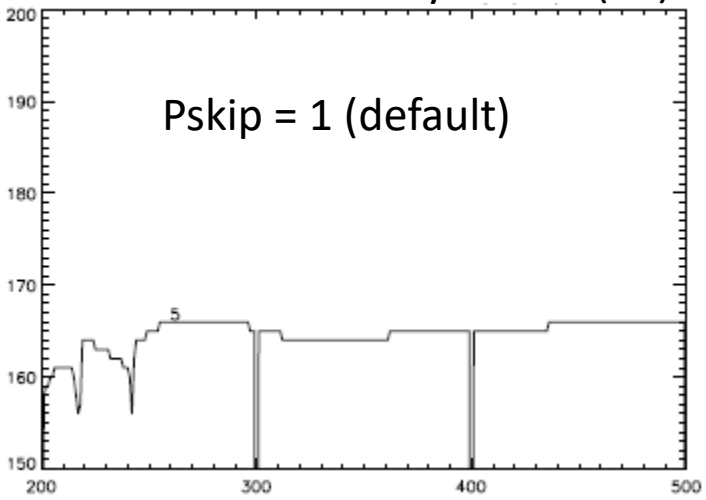
Bill Dorland email (6/12/2020):

- We selected two PPPL codes for testing candidate hardware, M3D-C1 and Gkeyll.
- The first candidate hardware will be available within 10 days (definite), and the rest within two weeks (we hope).
- By two weeks from yesterday, we should have the first tests completed.
- Our campus partners are also putting forward some codes for testing.
- Jin Chen is the point of contact for M3D-C1 and Ammar is the point of contact for Gkeyll.
- It is expected that we will be able to log on to the new machine in the Sept-Oct timeframe.

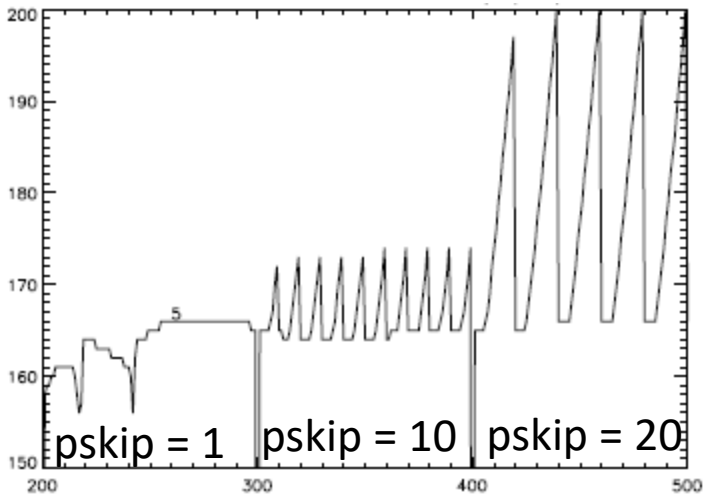
Jin: Do you have a good selection of runs?

Test of pskip and nskip

GMRES its. Velocity matrix (#5)



GMRES its. Velocity matrix (#5)

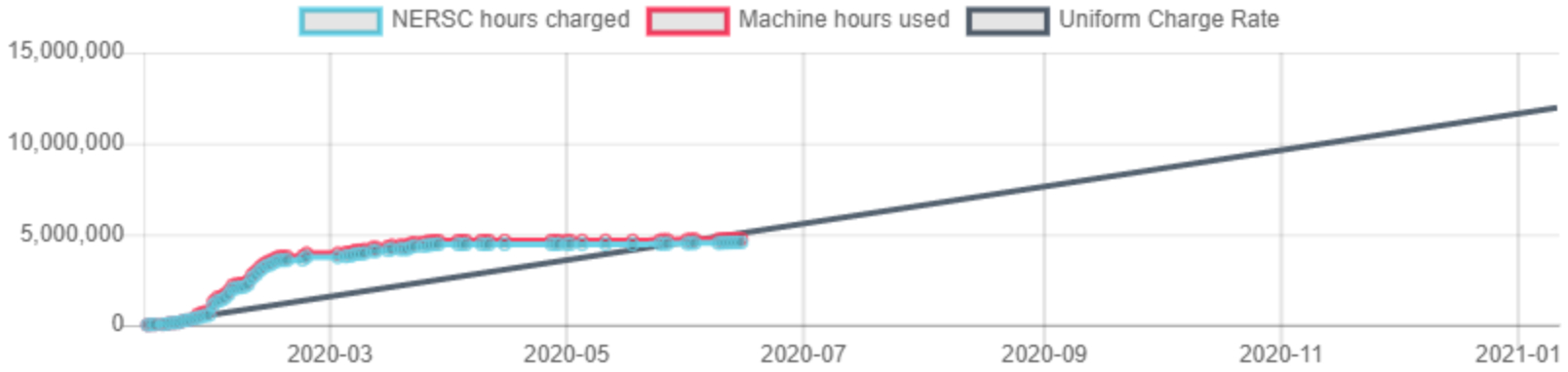


interval	pskip	Time wo pskip	Time w pskip	diff	% improvement
300-400	10	10:16	9:28	48 min	8.5%
400-500	20	10:07	9:47	20 min	3.4%
500-600	5	10:16	9:57	19 min	3.0%

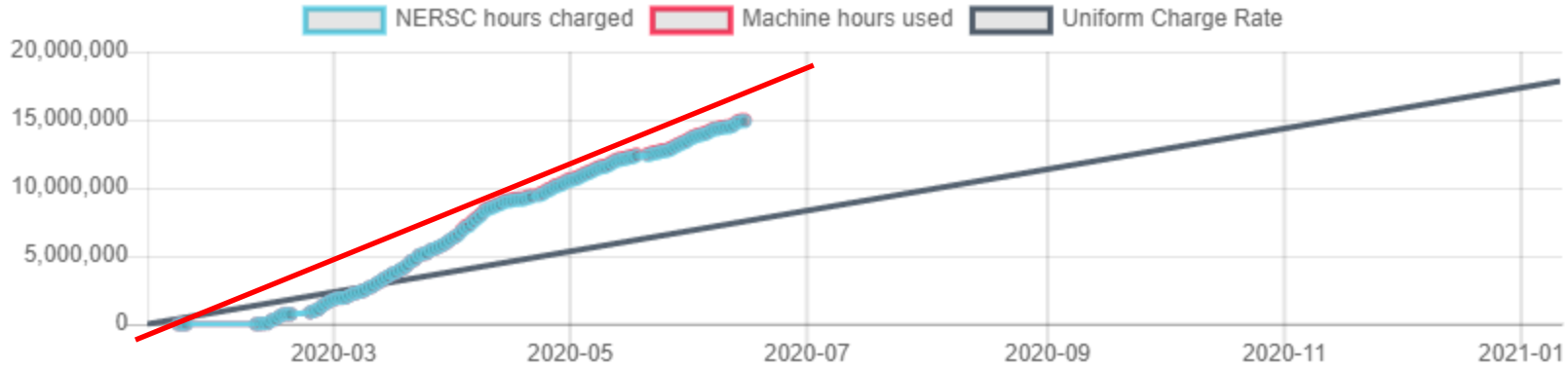
- Some modest improvement with pskip = 10
- I have not gotten a stable run with nskip .gt. 1 Any examples by others?

NERSC

MP288



M3163



Need to use less mp288. m3163 approaching linear usage rate

Add to batch file: #SBATCH –account=3163

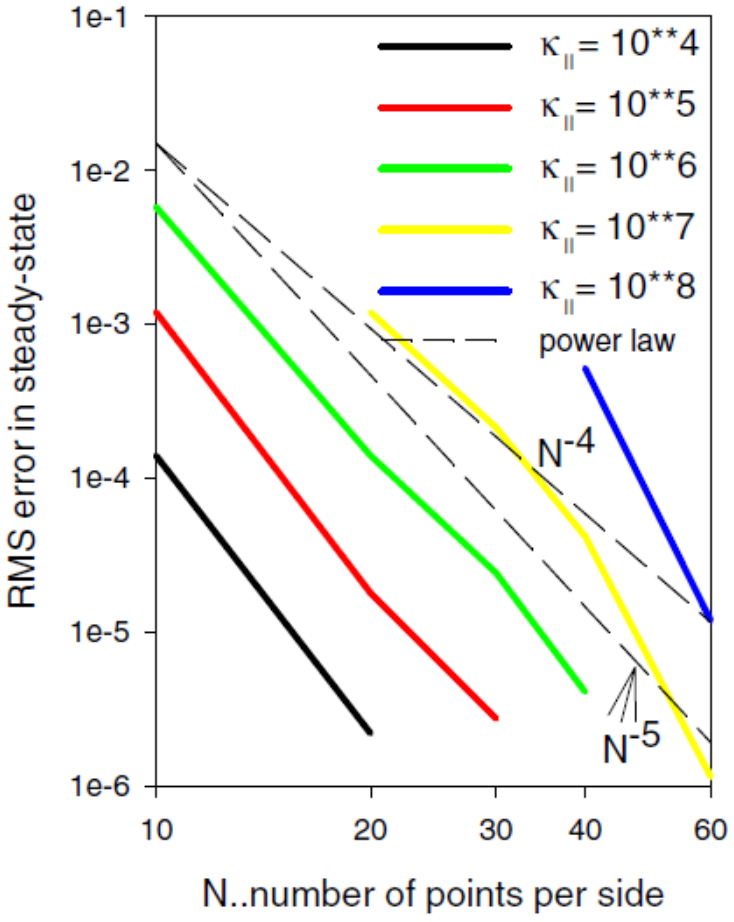
(clauser, kleiner, lyons, strauss)

Changes to github master since last week

- Chen: ported to MARCONI
- Clauser: added ablation model ipellet_abl=43

Documented changes in NEWDOC-latest: m3dc1.pppl.gov

Error in parallel thermal conductivity



Jardin, JCP (2004)

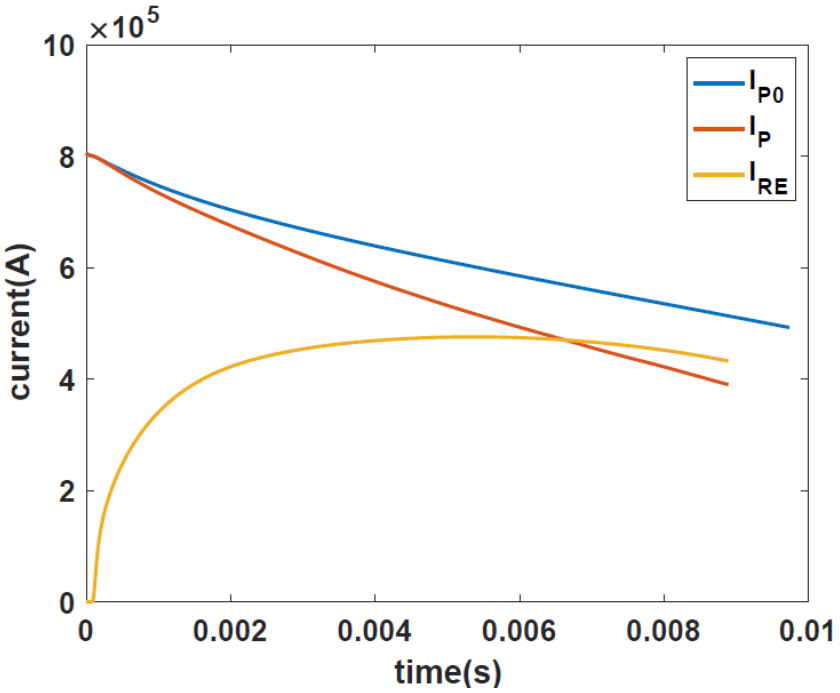
Current Spike during Disruption

Lyons to present

2D ITER VDE with new structure

Clauser to present

Runaways with Sources

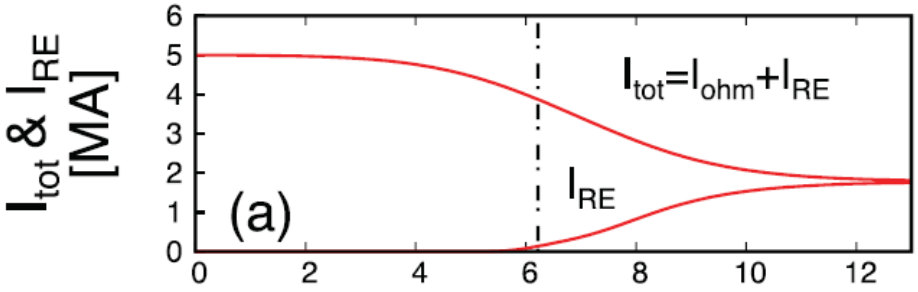


Chen: June 9, 2020

Nucl. Fusion **57** (2017) 066038 https://doi.org

Reduced fluid simulation of runaway electron generation in the presence of resistive kink modes

A. Matsuyama[a], N. Aiba and M. Yagi

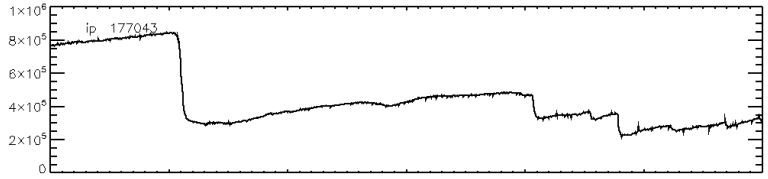


$$\frac{\partial n_{\mathrm{RE}}}{\partial t} + (v_{\mathrm{RE}}\mathbf{b} + \mathbf{u}) \cdot \nabla n_{\mathrm{RE}} = S_{\mathrm{Dreicer}} + S_{\mathrm{avalanche}},$$

$$E = \eta(J - en_{\mathrm{RE}}c),$$

M3D-C1 coupling to RE code KORC

- Plan to target DIII-D shot 177053 after Chen has a full simulation with fluid runaway electrons



- KORC can now run using fields, densities, and temperatures from M3D-C1 hdf5 files using Nate's Fusion-IO routines
  - Nate to add impurity densities

- In the mean time, they have expressed interest in modeling one of Cesar's NSTX-U C-pellet shots
  - Cesar has moved files to portal, and both Matthew and Diego have obtained PPPL computer accounts
  - Cesar to run 1 case out to longer time to get full thermal quench
  - Scheduled ZOOM call Thursday June 18 11:00 AM

That’s All I have

Anything Else ?