M3D-C1 ZOOM Meeting

04/25/2022

Upcoming meetings and deadlines

CS Issues

1. Linear MHD GIT Repo
2. Mesh adaptation update - Morteza
3. NERSC Time
4. Changes to github master since last meeting
5. Regression tests
6. imp_hyper coding

Physics Studies

1. Papers in preparation
2. More on infernal mode temperature flattening
    1. Convergence with NPLANES and Aspect Ratio Dependence
3. Rotational stabilization of the RWTM --Strauss

Note: **meeting minutes posted on m3dc1.pppl.gov**

In attendance

Steve Jardin
Dingyun Liu
Hank Strauss
Nate Ferraro
Chang Liu
Anders Kleiner
Brendan Lyons
Jin Chen
Chen Zhao
Cesar Clauser
Mark Shephard
Seegyoung Seol
Morteza Siboni

Upcoming Meetings and Deadlines

- IAEA Technical Meeting on Plasma Disruptions and their Mitigation 19-22 July
  - In person at ITER HQ in France
  - Abstract submission by May 31

- APS Meeting Oct 17-21 (Spokane WA)
  - Invited talk nominations May 4

- INSITE requests for FY 23 now open for Frontier(EF), AORORA(EF), Polaris(44PF), Summit(200PF), Theta(12PF)

Linear MHD GIT repo

Jin Chen has put some legacy equilibrium and linear MHD codes on GITHUB

Balloon
Camino
Checkgs
Jsolver
Map2
Mapck
Qsolver

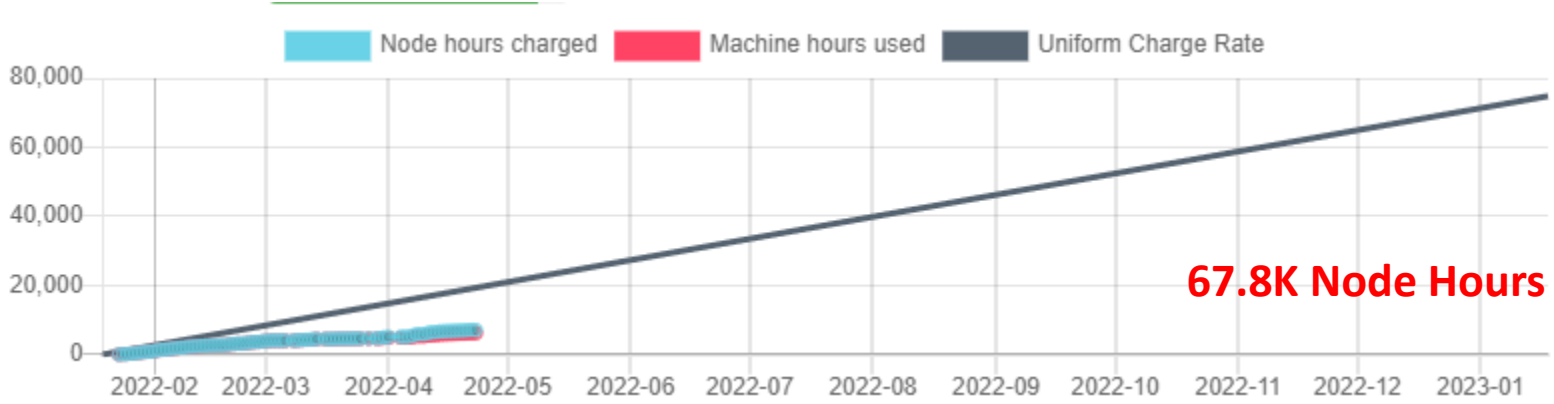
Are the PEST codes available?

Mesh adaptation update

Discussion on Unified Build

NERSC Time

mp288



67.8K Node Hours remaining

- We are NESAP Tier 2 for Pearlmutter. . Phase-I w GPUs We have been given a repo m3984 with a small allocation. Presently we are not being charged.
- N9ES-N2 M3D-C1: J. Chen , C. Liu, S. Seol are early users

- We are under-utilizing our time on cori. We will lose 17K Node Hours on May 19th because we have used less than 5% of initial allocation. Next Reduction is Sept 15, when we should have used 25%

Local Systems

- PPPL centos7(04/24/22)
  - 7 jobs PASSED
- PPPL greene (04/24/22)
  - 5 jobs PASSED
- STELLAR (04/24/22)
  - 7 regression tests **PASSED** on stellar
- TRAVERSE_gpu(04/24/22)
  - 5 regression tests **PASSED**
  - KPRAD_2D, KPRAD_restart failed due to 0.001 fractional diff in C1ke

NERSC

- Cori-KNL (04/25/2022)
  6 regression tests **PASSED**
  NCSX **FAILED** with segmentation fault

- Cori-Haswell (04/25/2022)
  7 regression tests **PASSED**

- Perlmutter (04/09/2022)
  - 6 regression tests **PASSED**
  - NCSX failed with segmentation fault

imp_hyper coding

Yao sent me a question about why, in metricterms_new.f90 routines b1beta, b2psieta, b2beta, b2feta there was a conditional test:

If(imp_hyper .le. 1) then …..

This statement is probably not needed. Some hyper terms are always treated implicitly. The imp_hyper > 0 just implies there is a new implicit variable: either jphi (for =1) or J•B (for =2). I'm not sure imp_hyper=0 is a viable option but will check.

He also asked if the velocity smoother could be applied to ϕ instead of $\nabla^2\phi$. I said he should try it.

Papers in Preparation

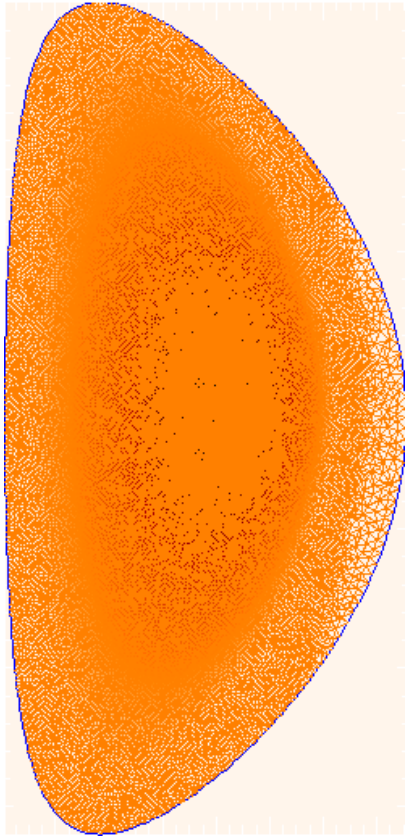
- S. Jardin, et al “Ideal MHD limited electron temperature in (spherical) tokamaks” ***presently under review***

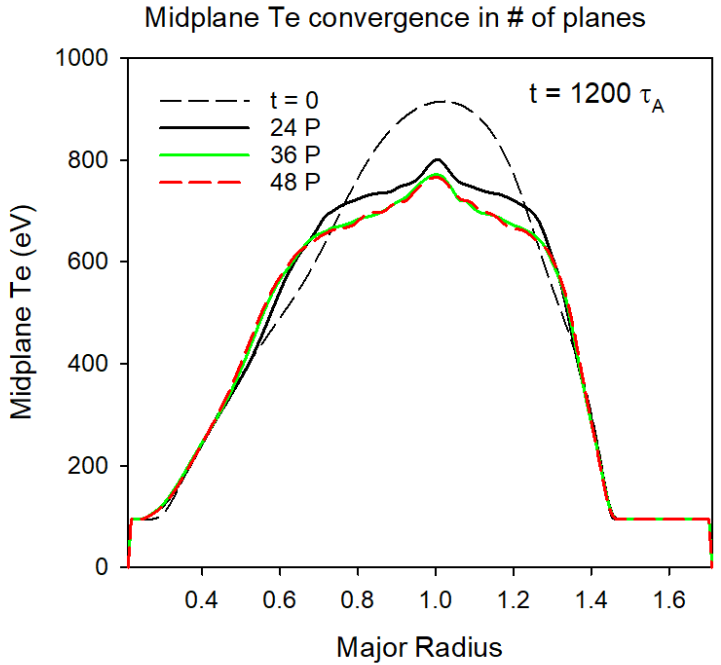
- Cheng Liu, et al “Thermal ion kinetic effects and Landau damping in fishbone modes” ***I plan to read this week***

- Chen Chao, C. Liu, et al, “Simulation of DIII-D disruption with pellet injection and runaway electron beam” ***I plan to read and comment this week.***

- ***J***. McClenaghan, B. Lyons, et al, “MHD modeling of shattered pellet injection in JET”

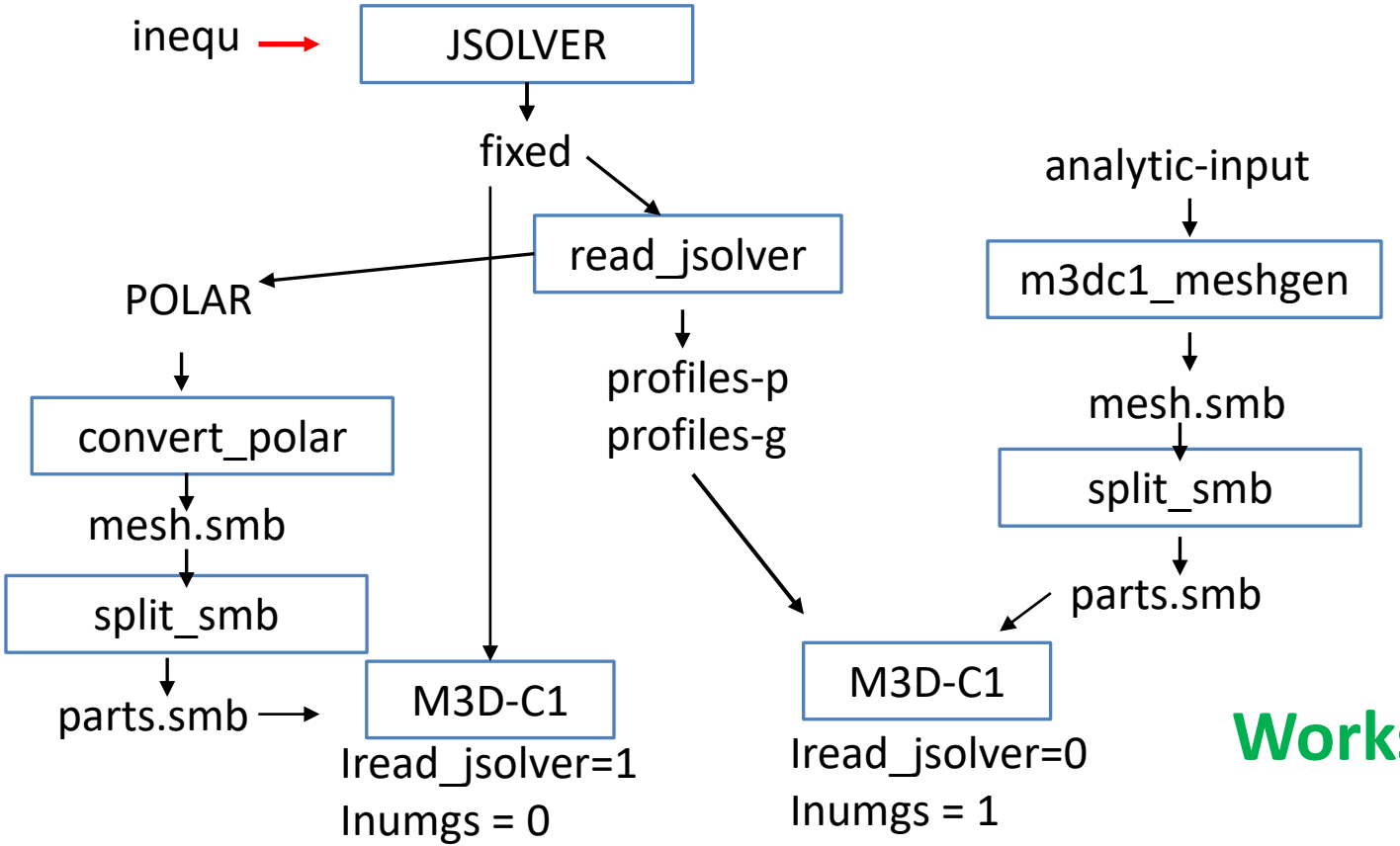
Convergence in NPLANES





36 and 48 plane cases are virtually identical

JSOLVER to M3D-C1

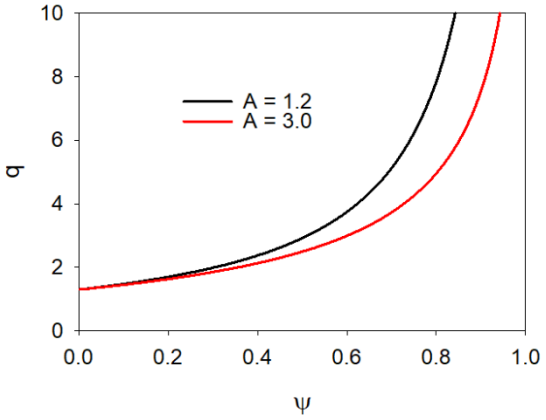


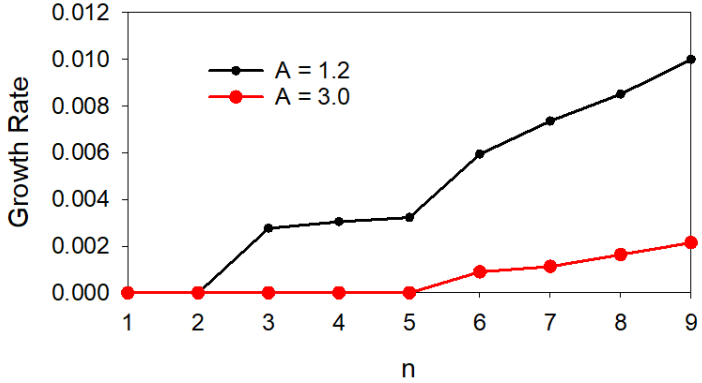
Fails

Works!

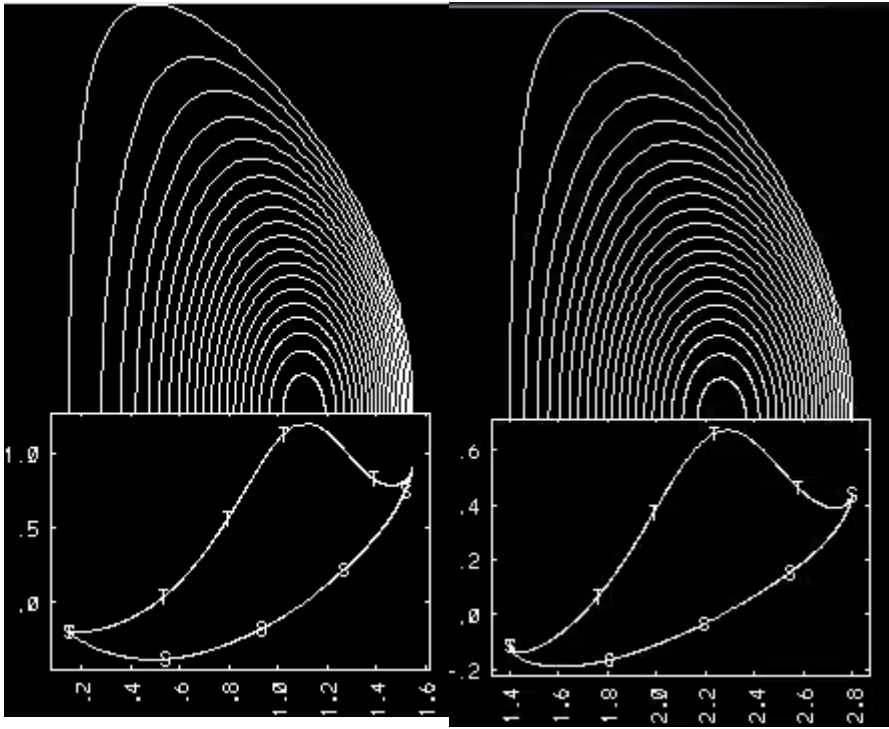
Aspect Ratio Comparison

	A=1.2	A=3.0
β	4.47	2.40
β_P	2.17	4.01
C_T	3.78	3.77
l_P	0.82	0.45



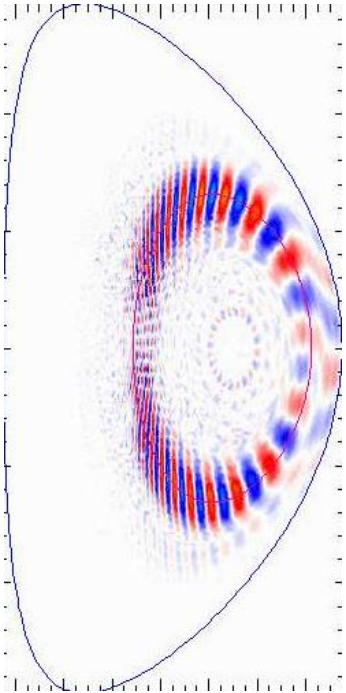


A = 1.2 A = 3.0

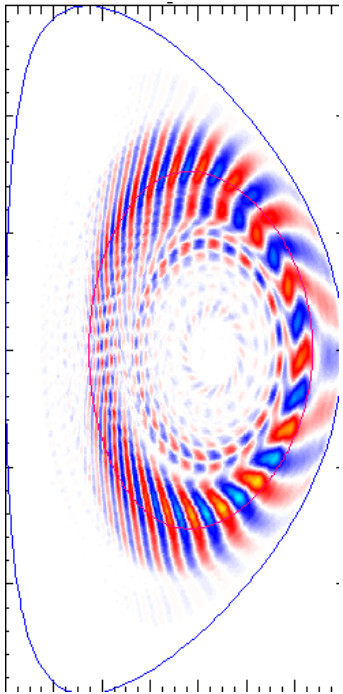


N=8 eigenfunctions

A=1.2



A=3.0



Rotational Stabilization of RWTM

Strauss to present

That’s All I have

Anything Else ?

Next Meeting (with LBL) in 1 week