

# M3D-C1 ZOOM Meeting

12/19/2022

## CS Issues

1. RPI Update on Meshing and Adaptation
2. Perlmutter status
3. New Latex documentation -
4. NERSC Time for 2022 and 2023
5. Changes to github master since last meeting
6. Regression tests
7. isurface

## Physics Studies

1. Update on NSTX shot 124379 and infernal modes
2. Chen Zhao, Brendan Lyons updates
3. Anything else

## In attendance

Steve Jardin

Hank Strauss

Min-Gu Yoo

Nate Ferraro

Jin Chen

Chen Zhao

Chang Liu

Brendan Lyons

Mark Shephard

Seegyong Seol

Usman Riaz

Sam

# RPI update on Meshing Capabilities and Adaptation

# Perlmutter

Perlmutter down Dec 12 -21 for system software and hardware upgrades.

# New LaTeX Documentation

A cleaned version of M3DC1 user's guide is uploaded to M3DC1/doc and this version compiles on all machines using the command "pdflatex M3DC1.tex".

.pdf version is available on [m3dc1.pppl.gov](http://m3dc1.pppl.gov)

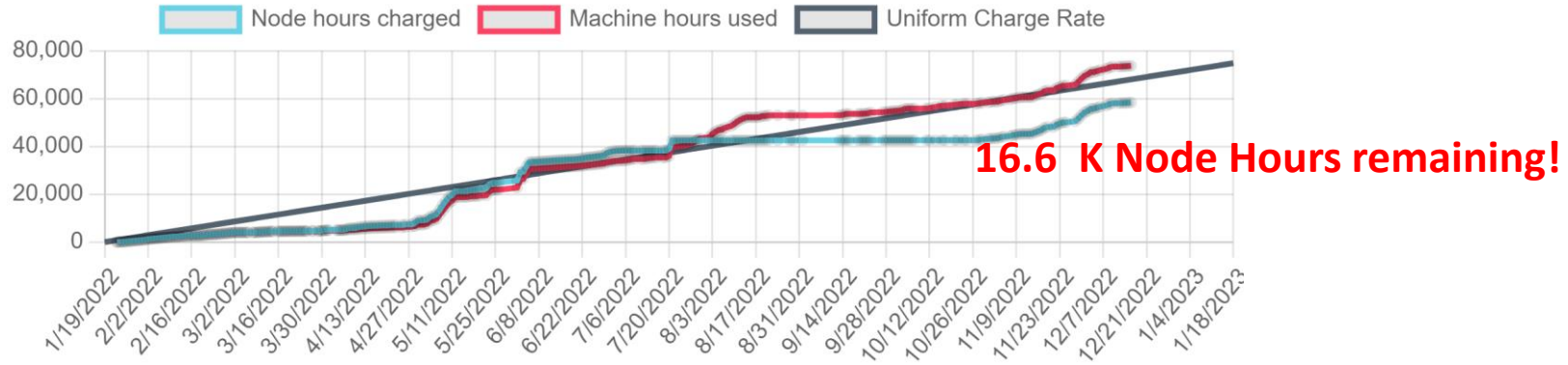
All C1input variables are now documented (section 6)

Appendix B (SCOREC API) now eliminated . (Thanks to Seegyong)

I will continue to (slowly) review sections for completeness and correctness.

# NERSC Time 2022

mp288



- MP288 usage is on track. Both value and rate are ok.
- We are now being charged for Perlmutter and Perlmutter\_cpu.
- We have 5151 GPU node hours as well. Initial allocation was 7000, then Chang requested AND RECEIVED another 7000!
- Cori to go away March 2023

# NERSC Time 2023

## MP288

CPU Node Hours Awarded 2023: 50,000

CPU Node Hours Awarded 2022: 75,000

CPU Node Hours Requested 2023: 125,000

GPU Node hours awarded: 10,000

Archiveal Storage awarded: 315 TB

Project Storage awarded: 25 TB

FES awards made by Michael Halfmoon

May be able to get more during year if other users do not use their entire allocation.

# Changes to github master --after 2022-12-04

## Seegyong Seol

**12/11/22:** cleaning up files for perlmutter-gnu

**12/15/22:** reverting C1ke for regtest/adapt

## Chang Liu

**12/05/22:** Fix adapt regression test on Perlmutter\_gpu

## Nate Ferraro

**12/16/22:** Corrected units of kprad\_n and kprad\_n0 scalars

**12/16/22:** Corrected units on eta\_j2 field

**12/16/22:** Changed color of mesh boundaries to work better with multi-region meshes



## Local Systems

- PPPL centos7(12/18/22)
  - 7 jobs **PASSED**
- PPPL greene (12/18/22)
  - 5 jobs **PASSED**
- STELLAR (12/18/22)
  - 7 regression tests **PASSED** on stellar
- TRAVERSE\_gpu(11/04/22)
  - Compilation error (being looked at by Seegyound , Jin, and Chang)

# NERSC

- Perlmutter (12/04/2022)
  - 6 jobs **PASSED**
  - NCSX failed with very small difference in C1ke
- Perlmutter\_cpu (12/04/22)
  - 6 jobs **PASSED**
  - NCSX failed with very small difference in C1ke
- Perlmutter\_gpu (12/04/2022)
  - pellet, RMP, & RMP\_nonlin, adapt all **PASSED**
  - KPRAD\_2D, KPRAD\_restart, NCSX all failed with very small differences

# isurface

- We plan to remove this option

## Update on NSTX shot 124379

I have asked Kathreen Thome and Joey McClenaghan (GA) to look at these cases with the ideal MHD codes GATO and DCON.

So far they have not found any instabilities!

Alan Turnbull asked for a higher resolution geqdsk (original one 82 x 82).

I generated a 512 x 512 with the IDL write\_geqdsk.

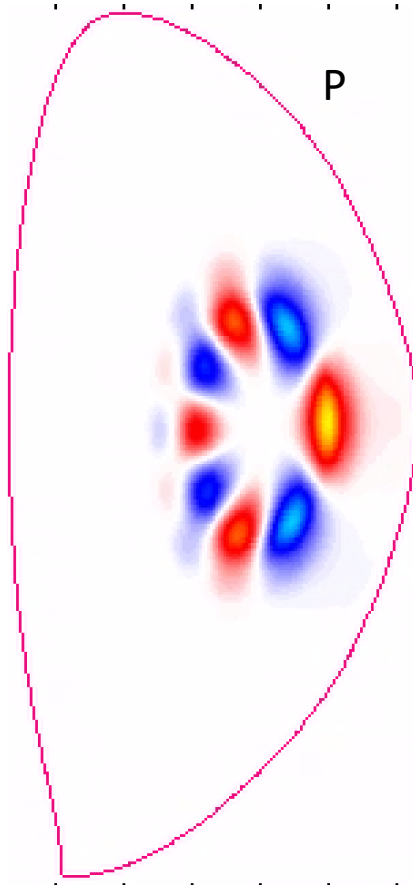
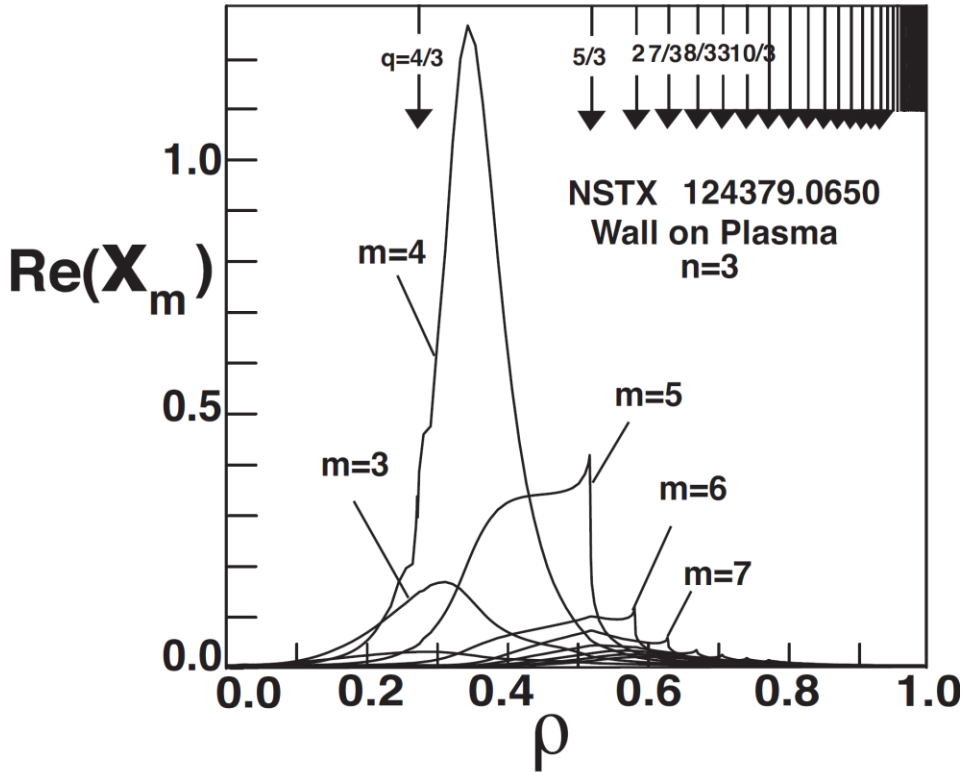
With this he found an unstable  $n=3$  mode with GATO. (next slide).

Higher- $n$  modes are very difficult for gato

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Now, trying to resurrect the PEST linear ideal MHD code as a check (with J. Chen). We have the code but no documentation or sample input files.

# Comparison of GATO and M3D-C1



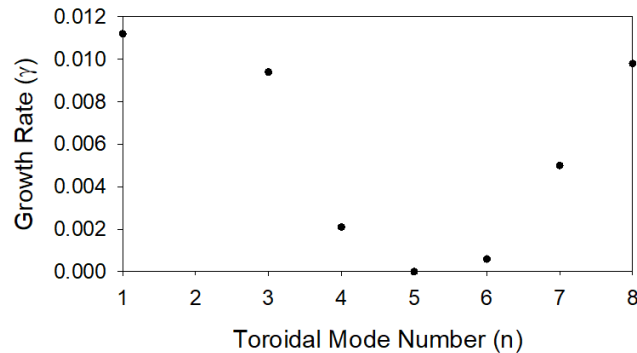
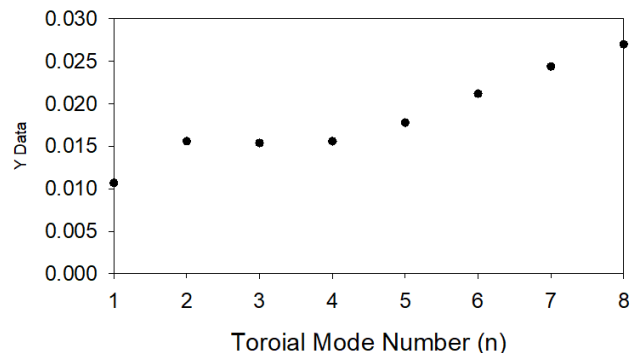
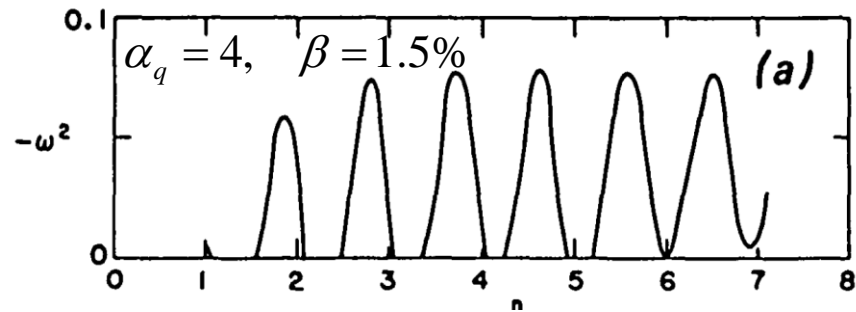
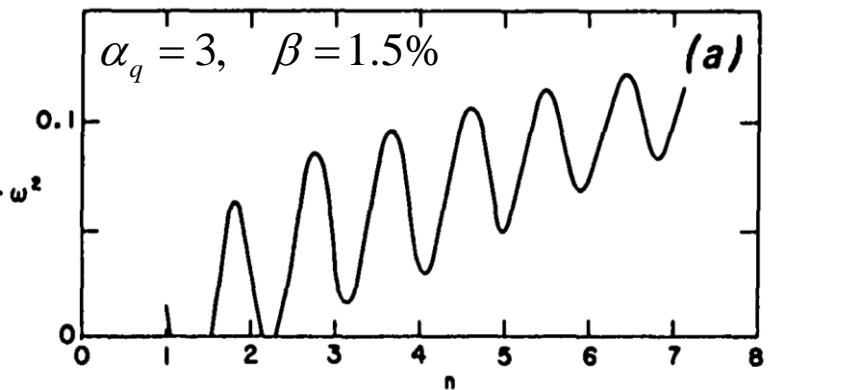
# Benchmark from Manickam, et al NF (1987)

$$q = q_0 + q_1 \Psi^{\alpha_q} \quad q_0 = 1.05, \quad q_1 = 2.05 \quad R/a = 4 \quad \text{circular}$$

$$p = p_0 (1 - \Psi^{\alpha_2})^{\alpha_1} \quad \alpha_1 = 4, \quad \alpha_2 = 1.5$$

These results are corrected from 11\_21\_22. Resistivity was too high in those!

## M3D-C1 Results



# Update on other Jobs

zhaoc@fusion.gat.com

## Simulation of DIII-D disruption with pellet injection and runaway electron beam

C. Zhao<sup>1,2</sup>, C. Liu<sup>2</sup>, S. C. Jardin<sup>2</sup>, N. M. Ferraro<sup>2</sup>, B. C. Lyons<sup>1,2</sup>

<sup>1</sup>*General Atomics, San Diego, CA, United States of America*  
<sup>2</sup>*General Atomics, San Diego, CA, United States of America*

- Chen's paper is going through DIII-D review
- Intends to send it to PRL
  
- Brendan, status of ITER DM run?
  
- Other

That's All I have

Anything Else ?