

Welcome to the Second Annual MFEM Community Workshop

October 25, 2022
mfem.org/workshop

Organizers



Aaron Fisher



Tzanio Kolev



Ketan Mittal



Will Pazner



Socratis Petrides

Interacting with the workshop



- We will be recording the workshop and posting videos of the talks.
- Please keep your mic muted during the talks.
- During the talks you can ask questions in the Zoom chat.
- Leave your camera off unless you are speaking (except for the upcoming group photo)
- Side conversations will be happening in the workshop slack channel.
(<https://mfemworkshop.slack.com>)
- If you are having trouble with the slack channel, ask for help in the chat.



Certificate of Participation



We have certificates for those who want or need them

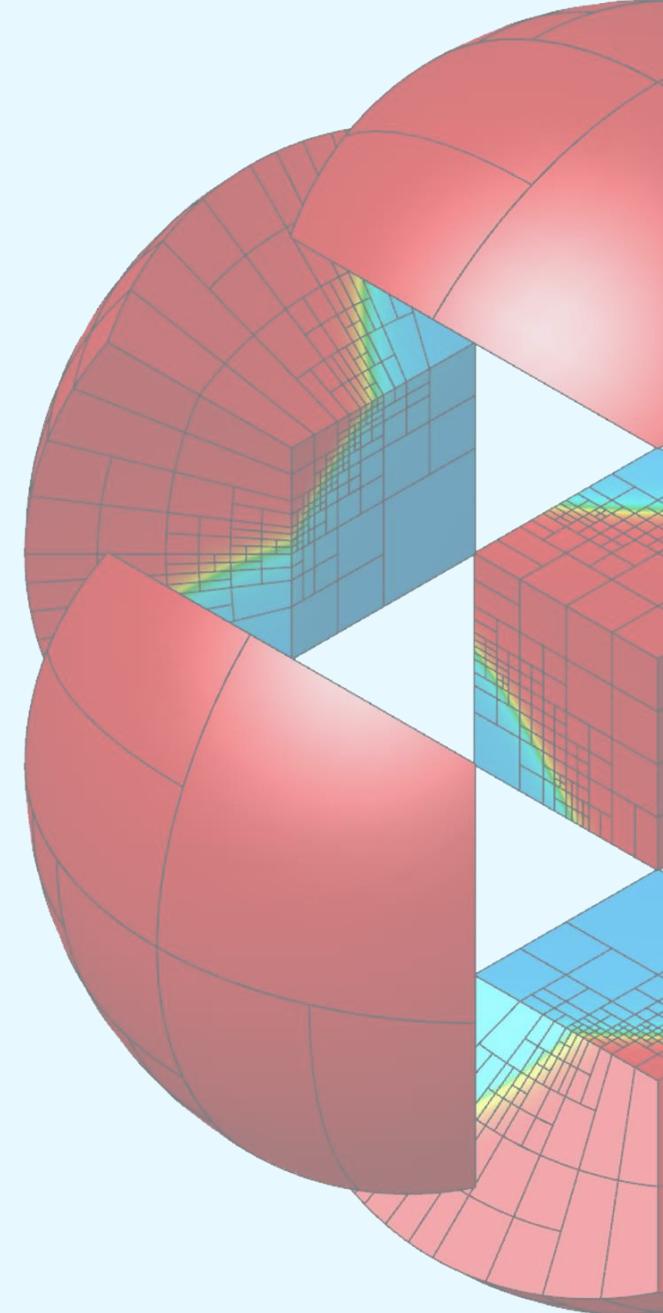


Agenda

Time (PDT, GMT-7)	Activity	Presenter			
					Alvaro Sanchez Villar (PPPL)
					Brian Young
					Christina Migliore (MIT)
7:40-8:00	Welcome & Overview	Aaron Fisher (LLNL)	10:20-11:20	Talks, Session II (20 mins each) Chair: Socratis Petrides	
8:00-8:20	The State of MFEM	Tzanio Kolev (LLNL)	11:20-11:40	Break	All Will Pazner (PDX)
8:20-8:40	Recent Developments	Veselin Dobrev (LLNL)	11:40-12:40	Talks, Session III (20 mins each) Chair: Aaron Fisher	Jorge-Luis Barrera (LLNL) Siu Wun Cheung (LLNL)
8:40-9:00	Break	All			
9:00-10:00	Talks, Session I (20 mins each) Chair: Will Pazner	Ben Zwick (University of Western Australia) Carlos Brito Pacheco (Université Grenoble Alpes) Tobias Duswald (CERN TUM)	12:40-1:00	Break	All Devlin Hayduke (ReLogic) Tim Brewer (Synthetik)
10:00-10:20	Group Photo	All	1:00-2:00	Talks, Session IV (20 mins each) Chair: Tzanio Kolev	Adolfo Rodriguez (OpenSim)
			2:00-2:20	Break	All
			2:20-2:40	MFEM AWS tutorial	Julian Andrej (LLNL)
			2:40-3:00	Wrap-up & Contest Winners	Aaron Fisher (LLNL)
			3:00-4:00	Q&A Session	MFEM team available on Zoom + Slack



Selected Survey Results



216 Participants from 34 countries and 120 organizations

National Laboratories

Lawrence Livermore National Laboratory
Los Alamos National Laboratory
Princeton Plasma Physics Laboratory
UK Atomic Energy Authority
Argonne National Laboratory
CEA
Hartree Centre
Leonardo Labs
Center for Advanced Systems Understanding
CERN
Flatiron Institute
Johns Hopkins University Applied Physics Lab
Leibniz Supercomputing Center
Naval Nuclear Laboratory
Oak Ridge National Laboratory

Industry

Amazon
Applied Materials
Google
OpenSim Technology
Relogic Research
Synthetic Applied Technologies
Aclectic Systems
Amgen
Apple
Applied Technology & Management
Async Computing
BS&A
CGG
EBITmax
Ecologi
ENSTA Bretagne
Fortress Technology Solutions
Good Simulations
IERUS Technologies
IISER Thiruvananthapuram
Intel
OpenParEM2D
Polytechnique Montreal
Procter & Gamble
Protection Engineering Consultants
Qorvo
Skyworks Solutions
Tata Consultancy Services
Tesco Controls
Woven Planet Holdings

Universities

IIT Guwahati
Universidad Nacional de Colombia
University of Western Australia
North Carolina State University
University of Illinois, Urbana Champaign
Cadi Ayyad University
ETH Zurich
Hong Kong Polytechnic University
Massachusetts Institute of Technology
Portland State University
Radon Institute for Computational and Applied Mathematics
University of Belgrade
University of Memphis
Utah State University
African Institute for Mathematical Science
AMET University
Brown University
California State University, Northridge
City University of Hong Kong
Cornell University
Cranfield University
Curtin university
Duke University
Federal University of Rio de Janeiro
Ferdowsi University of Masshad

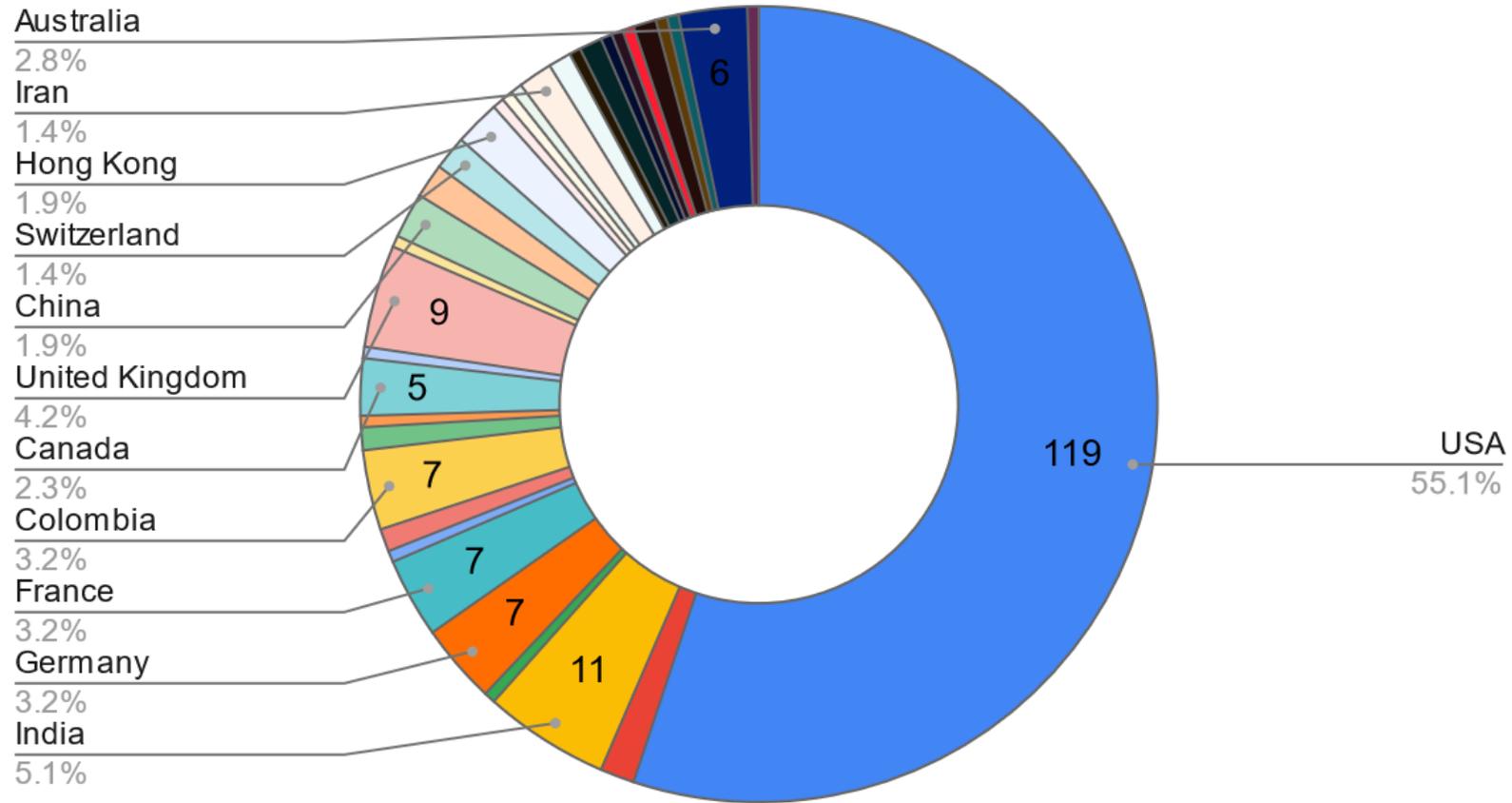
Friedrich-Alexander-Universität Erlangen-Nürnberg
Harvard University
Hong Kong Baptist University
Hong Kong Center for Cerebro-Cardiovascular Health Engineering
IIT Roorkee
Imam Abdulrahman Bin Faisal University
Indian Institute of Science
Institute of Mechanics of Materials
Institute of Theoretical and Experimental Astronomy
Instituto Nacional de Astrofísica, Óptica y Electrónica
Isfahan University of Technology
Johannes Gutenberg-University Mainz
Johns Hopkins University Applied Physics Lab
Kaunas University of Technology
King Abdullah University of Science and Technology
Kosar University of Bojnord
Mississippi State University
MIT Plasma Science and Fusion Center
Morgan State University
National University of Colombia
Oakland University
Pennsylvania State University
Purdue University
Ruhr University Bochum
RWTH Aachen

Simon Fraser University
Tel Aviv University
Tongji University
Univeristy of Lisbon
Universidad de Valparaiso
Universite Grenoble Alpes
Universiti Kuala Lumpur
University Grenoble Apes
University of British Columbia
University of California, Berkeley
University of California, Merced
University of Cambridge
University of Cape Coast
University of Limerick
University of Liverpool
University of Minho
University of Notre Dame
University of Oulu
University of Pennsylvania
University of Texas, Austin
University of Texas, San Antonio
University of Waterloo
University of West Florida
Vienna Technical University
Zhejiang University



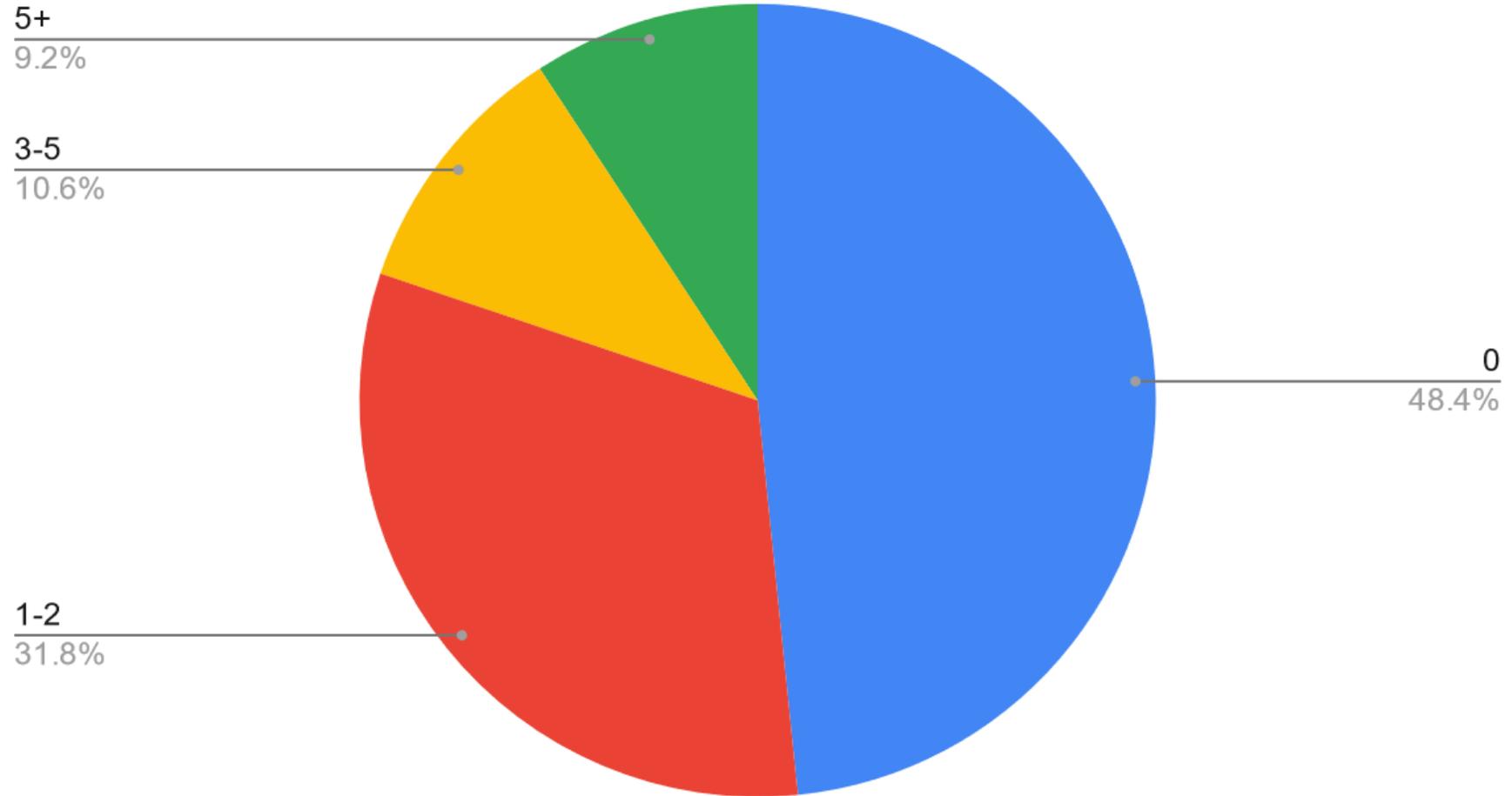
Participant countries

Countries

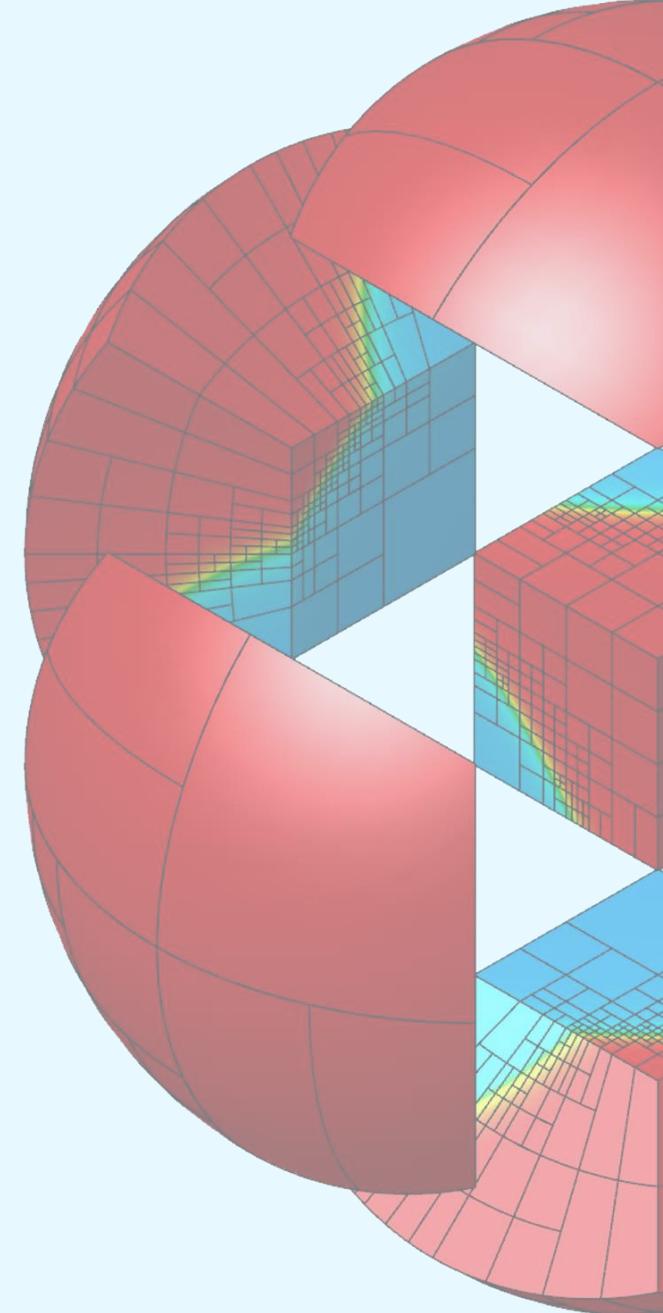


Years of experience with MFEM

Years of MFEM Experience



MFEM Resources



MFEM on Github (https://github.com/mfem/mfem)

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mfem / mfem Public

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master 419 branches 26 tags

Go to file Add file Code

 tzanio Merge pull request #3266 from mfem/new-dev-version-4.5.1 ...	d84884d 2 hours ago	16,670 commits
 .binder	More small adjustments before the release	7 months ago
 .github	Keep the log from upgrading Doxygen configuration	2 months ago
 .gitlab	Update gitlab pipelines from 30min to 45min.	6 months ago
 config	Use C++14 when SUNDIALS is enabled; needed for SUNDIALS >= 6.4.0	3 days ago
 data	Fix various typos	3 months ago
 doc	Update version numbers to 4.5.1 -- a new development version	5 hours ago
 examples	Merge branch 'master' into hypre-2-26-0-fixes	4 days ago
 fem	Fix bug when using IntegratedGLL basis in thread safe mode	3 days ago
 general	Fix a bug:	3 days ago
 linalg	More typos	3 days ago
 mesh	More typos	3 days ago
 miniapps	Merge branch 'master' into mfem-4.5-dev	3 days ago
 tests	Merge pull request #3257 from mfem/hypre-2-26-0-fixes	3 days ago

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Releases 9



MFEM on Github (https://github.com/mfem)



MFEM

a lightweight, general, scalable C++ library for finite element methods

Lawrence Livermore National Laborat... <https://mfem.org> Verified

- Overview
- Repositories 10
- Packages
- People 456
- Teams 6**
- Projects 2

Pinned

mfem Public Lightweight, general, scalable C++ library for finite element methods C++ 810 300	PyMFEM Public Python wrapper for MFEM C++ 66 28	data Public Additional (large) datafiles for MFEM 2
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Repositories

Find a repository... Type Language Sort New

mfem Public

Lightweight, general, scalable C++ library for finite element methods

C++ 810 BSD-3-Clause 300 45 (2 issues need help) 103 Updated 3 minutes ago

People



[View all](#)

Top languages

- C++
- Python
- HTML
- Less

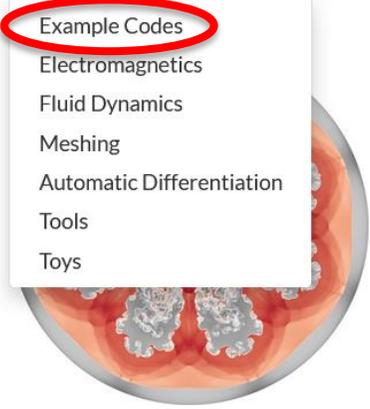
Most used topics

- fem
- scientific-computing



Curious about using MFEM mfem.org (<https://mfem.org>)

- Example Codes
- Electromagnetics
- Fluid Dynamics
- Meshing
- Automatic Differentiation
- Tools
- Toys



High-order multi-material hydrodynamics in the [BLAST](#) code

MFEM is a *free, lightweight, scalable* C++ library for finite element methods.

Features

- Arbitrary high-order finite element [meshes](#) and [spaces](#).
- [Wide variety](#) of finite element discretization approaches.
- Conforming and nonconforming [adaptive mesh refinement](#).
- Scalable from laptops to [GPU-accelerated](#) supercomputers.
- ... and [many more](#).

MFEM is used in many projects, including [BLAST](#), [Cardioid](#), [VisIt](#), [RF-SciDAC](#), [FASTMath](#), [xSDK](#), and [CEED](#) in the [Exascale Computing Project](#). See also our [Gallery](#), [Publications](#), [Videos](#) and [News](#) pages.

News

- Oct 22, 2022 [Version 4.5 released](#).
- Aug 18, 2022 [MFEM Community Workshop](#) in October 2022.
- Aug 15, 2022 [MFEM tutorial](#) on AWS.
- Jan 20, 2022 [FEM@LLNL seminar series](#) starting.

Latest Release

[New features](#) | [Examples](#) | [Code documentation](#) | [Sources](#)

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[Older releases](#) | [Python wrapper](#) |  [launch](#)  [binder](#)

Documentation

[Building MFEM](#) | [Getting Started](#) | [Finite Elements](#) | [Performance](#)

New users should start by examining the [example codes](#).

We also recommend using [GLVis](#) for visualization.

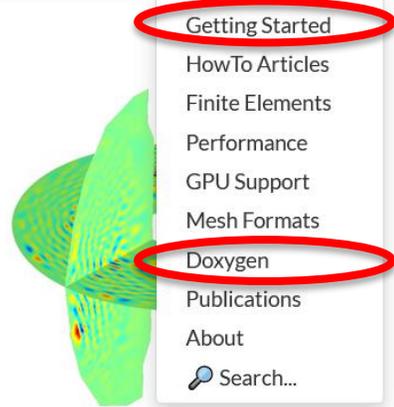
Contact

Use the GitHub [issue tracker](#) to report [bugs](#) or post [questions](#) or [comments](#).

See the [About](#) page for citation information.



Getting started on mfem.org (<https://mfem.org>)



Electromagnetic wave propagation in the NSTX-U tokamak

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New: versioned doxygen docs.mfem.org

MFEM Code Documentation

Doxygen-generated documentation for the following MFEM releases is available:

Latest Release

- [mfem-4.5](#) , released in Oct 2022, documented at [docs.mfem.org/4.5](#)

Older Releases

- [mfem-4.4](#) , released in Mar 2022, documented at [docs.mfem.org/4.4](#)
- [mfem-4.3](#) , released in Jul 2021, documented at [docs.mfem.org/4.3](#)
- [mfem-4.2](#) , released in Oct 2020, documented at [docs.mfem.org/4.2](#)
- [mfem-4.1](#) , released in Mar 2020, documented at [docs.mfem.org/4.1](#)
- [mfem-4.0](#) , released in May 2019, documented at [docs.mfem.org/4.0](#)
- [mfem-3.4](#) , released in May 2018, documented at [docs.mfem.org/3.4](#)
- [mfem-3.3.2](#) , released in Nov 2017, documented at [docs.mfem.org/3.3.2](#)
- [mfem-3.3](#) , released in Jan 2017, documented at [docs.mfem.org/3.3](#)
- [mfem-3.2](#) , released in Jun 2016, documented at [docs.mfem.org/3.2](#)
- [mfem-3.1](#) , released in Feb 2016, documented at [docs.mfem.org/3.1](#)
- [mfem-3.0](#) , released in Jan 2015, documented at [docs.mfem.org/3.0](#)
- [mfem-2.0](#) , released in Nov 2011, documented at [docs.mfem.org/2.0](#)

See also [mfem.org/download](#) and [github.com/mfem/doxygen](#).



FEM@LLNL Seminar Series: mfem.org/seminar/

[MFEM](#)[Features](#)[Examples ▾](#)[Documentation ▾](#)[Community ▾](#)[Gallery](#)[Download](#)[GitHub](#)

FEM@LLNL Seminar Series

We are happy to announce a new FEM@LLNL seminar series, starting in 2022, which will focus on finite element research and applications talks of interest to the MFEM community. We have lined up some excellent speakers for our first year and plan to keep adding more. Videos will be added to a [YouTube playlist](#) as well as this site's [videos page](#).

✉ Sign-Up

Fill in [this form](#) to sign-up for future FEM@LLNL seminar announcements.

★ Next Talk



Garth Wells (University of Cambridge)

FEniCSx: design of the next generation FEniCS libraries for finite element methods

[9am PDT, November 8, 2022](#)

Abstract: TBD

[FEM@LLNL Seminar Series](#)[Sign-Up](#)[Next Talk](#)[Previous Talks](#)[Future Talks](#)

<https://mfem.org/seminar/#next-talk>

✓ Previous Talks



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