

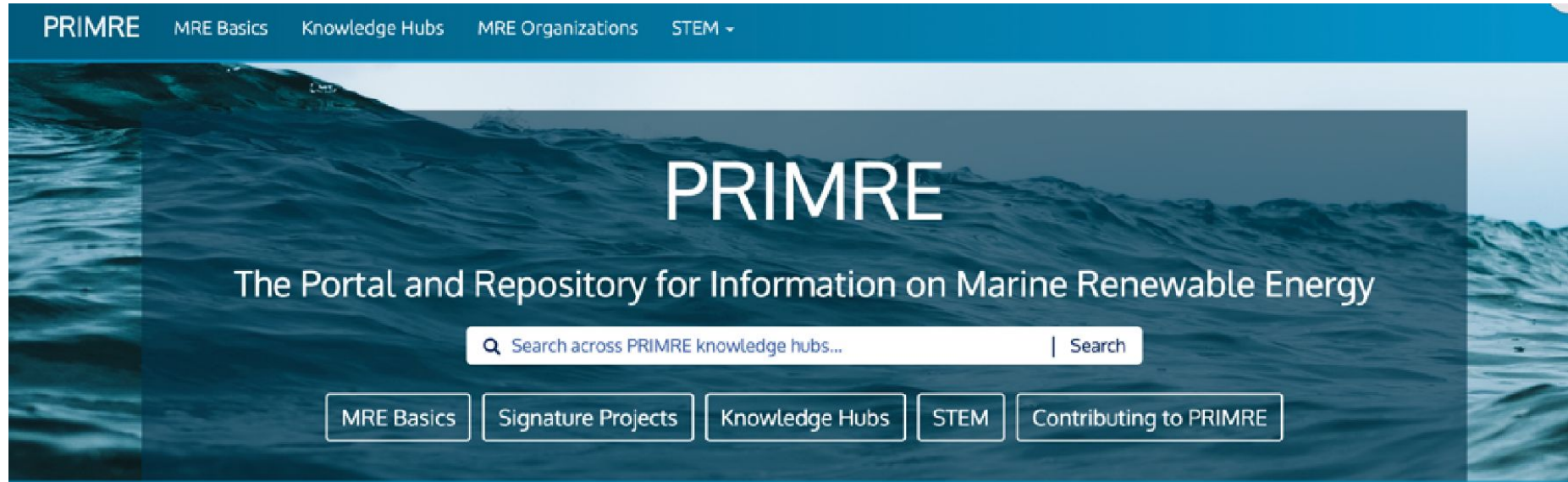
PRIMRE Workshop Breakout Group

Introducing MRE Software

**Hosted by Kelley Ruehl, Mat Topper, and Cesar Castillo
(Sandia National Laboratories and Data Only Greater)**

Ocean Renewable Energy Conference
September 24, 2021

PRIMRE (Portal and Repository for Information on Marine Renewable Energy)



PRIMRE seeks to provide broad access to engineering, resource characterization, and environmental effects information on marine renewable energy projects to facilitate the commercial development of the MRE industry.

<https://openei.org/wiki/PRIMRE>

PRIMRE Knowledge Hubs

1. Tethys
2. Tethys Engineering
3. Marine Energy Projects Database
- 4. MRE Software**
5. Telesto
6. Marine Energy Atlas
7. MHK Data Repository

https://openei.org/wiki/PRIMRE/Knowledge_Hubs



PRIMRE Knowledge Hubs


- [Marine and Hydrokinetic Data Repository \(MHKDR\)](#) hosts data collected by WPTO funded R&D, including device testing data, resource characterization data, etc.
- [Tethys](#) hosts over 6,700 documents on the environmental effects of wind and MRE development and supports Ocean Energy Systems' Environmental initiative.
- [Tethys Engineering](#) hosts over 4,800 documents on the engineering and technical aspects of MRE development, as well as a library of MRE photos for third-party use (2019)



MHK Data Repository

The Marine Hydrokinetic Data Repository (MHKDR) is the repository for data collected using funds from the Water Power Technologies Office of the U.S. Department of Energy (DOE). It contains data on MHK devices, testing, resource and environmental impact assessments, cost analyses, and more.

[View MHKDR](#)



Tethys

Tethys facilitates the exchange of information and data on the environmental effects of wind and marine renewable energy technologies and serves as a commons for wind and marine renewable energy practitioners and therefore enhance the connectedness of the renewable energy community.

[View Tethys](#)




Tethys Engineering

Tethys Engineering stores documents from around the world about the technical and engineering aspects of marine renewable energy.

[View Tethys Engineering](#)

PRIMRE Knowledge Hubs

- [MRE Technology Database](#) contains information on MRE devices, points to companies active in the MRE field, and traces the development of projects around the world (2020)
- [Telesto](#) is a collection of information and guidance for testing, measurement, and data analysis for MRE research, development, and demonstration (2020)



MRE Technology Database

Provides up-to-date information on marine and hydrokinetic renewable energy. The database includes wave, tidal, current, and ocean thermal energy, and contains information on the various energy conversion technologies, companies active in the field, and development of projects in the water.

[View Tech Database](#)



Telesto

Telesto is home to open source Wikis and Databases which provide a comprehensive explanation of and guidance for MRE testing, measurement, and data processing based on experience, lessons learned from prior laboratory and field testing, industry standards, and best practices.

[Visit Telesto](#)

MRE Software

A collection of MRE relevant software, including the code hub and code catalog. The code hub is a collection of open source MRE software for simulating devices, and processing and analyzing data. The code catalog is a searchable online software discovery platform with a faceted search to identify software tools, codes and other software products.

[View MRE Software](#)

- [MRE Software](#) is a collection of software relevant to MRE development, including the [MRE Code Hub](#) and [PRIMRE Code Catalog](#) (2020)

<https://openei.org/wiki/PRIMRE/Software>

MRE Software Knowledge Hub

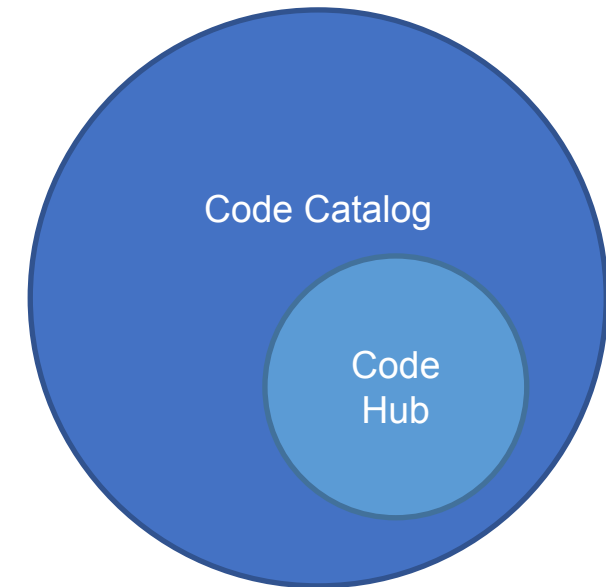
The screenshot shows the PRIMRE website's 'Software' section. At the top is a navigation bar with 'PRIMRE' and links for 'About', 'Knowledge Hubs', 'Events', 'MRE Basics', and 'STEM'. Below the navigation bar, the page title is 'PRIMRE / Software'. The main heading is 'MRE Software', followed by a descriptive paragraph: 'The MRE Software knowledge hub is a collection of relevant software for Marine Renewable Energy (MRE). The code catalog is a searchable online software discovery platform with a faceted search to identify commercial and open-source software tools, whereas the code hub is a collection of open-source MRE software with search facets relevant to open-source software.' Below this are three main content areas: 'PRIMRE Code Catalog' (described as a searchable platform for all software), 'MRE Code Hub' (described as a collection of open-source software on GitHub), and 'Best Practices' (marked as '(future work)'). A 'PRIMRE Guidelines' link is at the bottom of the main content area.

All MRE software, commercial and open-source

Open-Source MRE software (on GitHub)

Software development best practices

Three summary cards are shown. The first is 'MRE Technology Database' with a document icon, describing it as a database of marine and hydrokinetic renewable energy information. The second is 'Telesto' with a wave icon, describing it as a home for open-source Wikis and Databases. The third is 'MRE Software' with a code icon, describing it as a collection of MRE relevant software including the code hub and code catalog.



<https://openei.org/wiki/PRIMRE/Software>

PRIMRE Code Catalog

https://openei.org/wiki/PRIMRE/Code_Catalog

Searchable online software discovery platform with search facets for all MRE relevant software

The screenshot shows the PRIMRE Code Catalog interface. At the top, there's a navigation bar with 'PRIMRE / Code Catalog'. Below it, a large banner reads 'Code Catalog' and 'Explore the PRIMRE Code Catalog to find software relevant to MRE research, analyses, performance assessment, LCOE, and more.' A search bar is present with the text 'Search the PRIMRE the Code Catalog'. On the left, there are filter options for License Type (All License Types, BSD 3-Clause 'New' or 'Revised' License, GNU Affero General Public License v3.0, GNU General Public License v3.0, GNU Lesser General Public License v2.1, GNU General Public License v2.0, MIT License, Mozilla Public License 2.0, The Unlicense, Proprietary/Copyrighted, Commercial Software), Programming Language (All Languages, MATLAB, Python, R#, JavaScript, Other), and Code Cost (All Costs, Free, \$, \$\$, \$\$\$, \$\$\$\$.). The main content area shows 'Showing 41 results' and lists three software entries: ANSYS AQWA (2020 R2, Jan 01, 2010), ANSYS BladeModeler (2020 R2, Mar 29, 2015), and ANSYS CFX (2020 R2, Jan 01, 2003). Each entry includes a brief description, website link, license type, source code availability, dependencies, cost, contact information, and online forum link.

ANSYS AQWA [edit]

version 2020 R2

Other

Submission Information

ANSYS Aqwa software addresses the vast majority of analysis requirements associated with hydrodynamic assessment of all types of offshore and marine structures. These include SPARs, FPSOs, Semi-submersibles, Tension leg platforms, Ships, Renewable energy devices, and Breakwaters. ANSYS Aqwa Suite extends ANSYS Aqwa Diffraction to include analysis capabilities for global performance of moored and/or connected systems subject to random sea states. Simulations may be static or dynamic in frequency and/or time domain. More advanced requirements, such as dynamic position systems and energy dissipation, can be accomplished through a user-defined function.

Submission Type	Commercial Software
URI	https://www.ansys.com/products/structures/ansys-aqwa
Landing Page	https://www.ansys.com/products/structures/ansys-aqwa
Tag(s)	hydrodynamics, structural mechanics, modeling, finite element modeling
Author(s)	ANSYS, Inc.
Organization	ANSYS, Inc.
Primary Contact	ANSYS, Inc.
Email Address	ansysinfo@ansys.com

License and Development Status

origination date Jan 01, 2010

License Type	Commercial Software
Dependencies	ANSYS AQWA License
Cost	\$\$\$

MRE Applicability and Technology Types

BEMRosetta [edit]

version v1.0

C++

Submission Information

Hydrodynamic coefficients viewer and converter for Boundary Element Method (BEM) solver formats

Submission Type	Public Repo (e.g. public git repo)
URI	https://github.com/izabala23/BEMRosetta
Landing Page	https://github.com/izabala23/BEMRosetta
Tag(s)	hydrodynamics, meshviewer, mesh-processing, potential-flow, offshore-wind-platforms, hydrodynamic-coefficients-viewer, boundary-element, wave-energy
Author(s)	Iñaki Zabala
Primary Contact	Iñaki Zabala
Online Forum	https://github.com/izabala23/BEMRosetta/issues

License and Development Status

origination date Mar 13, 2019

License Type	GNU General Public License v3.0
Source Code Availability	Compiled code (with source code available)
Cost	Free

MRE Applicability and Technology Types

MRE Technology Type	Wave
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MRE Code Hub <https://mrecodehub.org/>

GitHub repository for open-source MRE software, includes a landing page with search functionality

MRE Code Hub U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

A collection of open-source software for the marine renewable energy (MRE) community

Browse MRE Code Hub Repositories
Browse the full list of registered MRE Code Hub repositories that have been contributed by the National Labs and the broader MRE community.

Search MRE Code Hub Source Code
Looking for specific code examples? Perform a full-text code search across all repositories in the MRE Code Hub.

Register Your Software
Click here to register your software so it can be discovered and shared with the MRE community.

Need help finding the right software tools for your MRE-related tasks?
PRIMRE Code Catalog
Visit the PRIMRE Code Catalog to find software by technology type and other key properties.

Looking for other MRE resources?
PRIMRE
Visit the Portal and Repository for Information on Marine Renewable Energy (PRIMRE).

New Releases

- tsdat v0.2.6**
Time series data utilities for declaratively applying standardization, Q/C, and transformations to datastreams.
Code Documentation
- WEC-Sim v4.3**
Wave Energy Converter Simulator (WEC-Sim), an open-source code for simulating wave energy converters.
Code Documentation
- MHKIT-Python 0.4.0**
MHKIT-Python provides the marine renewable energy (MRE) community tools for data processing, visualization, quality control, resource assessment, and device performance.
Code Documentation

MRE Code Hub U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

> Browse MRE Code Hub Repositories

Search

31 repositories found Sort By: Most Recent

License

- Not Specified 9
- Apache License ... 6
- GNU General Pu... 6
- Other 6
- BSD 3-Clause "... 4

Language

- MATLAB 11
- Python 11
- Fortran 8
- C 4
- C++ 3
- JavaScript 2
- TeX 2
- Coq 1
- OpenEdge ABL 1
- PostScript 1
- Roff 1
- SCSS 1
- Shell 1
- Turing 1

Last Updated

- Past 30 days 15
- 30 to 60 days ago 4
- 60 to 90 days ago 3
- 90+ days ago 9

Last Released

- Past 6 months 4
- 6 months to 1 year ... 3
- 1+ year ago 7

Release

- Has a release 14

WEC-Sim
Wave Energy Converter Simulator (WEC-Sim), an open-source code for simulating wave energy converters.
Apache License 2.0
MATLAB

WV3
WAVEWATCH III
Other
Fortran PostScript TeX
Shell

capytaine
Python BEM solver for linear potential flow, based on Nemoh.
GNU General Public License v3.0
Python Fortran

Activity Updated: a day ago

Issues	Pull Requests	Contributors
8 ✓ 509	5 ✓ 191	25

Releases
v4.3 (7/22/2021) 16

Forks
113

DOI 10.5281/zenodo.5122959

Run MATLAB tests on master branch passing

Activity Updated: 3 days ago

Issues	Pull Requests	Contributors
82 ✓ 195	9 ✓ 194	23

Releases
6.07.1 (4/19/2019) 2

Forks
244

Activity Updated: 5 days ago

Issues	Pull Requests	Contributors
20 ✓ 47	5 ✓ 21	7

Releases
v1.2.1 (4/14/2021) 8

Forks
34

Pypi Downloads
1 23 89

build passing JOSS: 10.21105/joss.01341

MRE Software

What MRE software do you/your organization use or develop?

Is there any specific MRE software or supporting tools that are not available as either commercial or open-source products? If so, which would be the most important to produce?

[Q&A on the Jamboard](#)

Code Catalog

https://openei.org/wiki/PRIMRE/Code_Catalog

What information would you like to find when searching for MRE software packages to use?

When searching for software for your use-case, which categories would you like to filter by?

Which search terms might you use to find a software package?

Which features of the code catalog are superior to searching using a general engine (like Google) and which are worse?

[Q&A on the Jamboard](#)

Code Hub <https://mrecodehub.org/>

As a software developer, what information would help you choose open-source software packages?

When searching for software to develop, which categories would you like to filter by?

Which search terms might you use to find a software package?

How would you like to sort the results of your searches?

Would it be useful to extend the functionality to software stored on other open-source repositories (e.g. GitLab, sourceforge)?

[Q&A on the Jamboard](#)

Thank you!

U.S. DEPARTMENT OF
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 **NREL**
Transforming ENERGY

 Pacific Northwest
NATIONAL LABORATORY

 Sandia
National
Laboratories

The National Renewable Energy Laboratory is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC. under contract No. DE-AC36-08GO28308. Pacific Northwest National Laboratory is operated by Battelle for the U.S. Department of Energy under contract DE-AC05-76RL01830. Sandia National Laboratories is a multitechnology laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.