NATIONAL ENERGY TECHNOLOGY LABORATORY

MFiX

17.1 Release

Jeff Dietiker, Justin Weber

Multiphase Flow Science Group

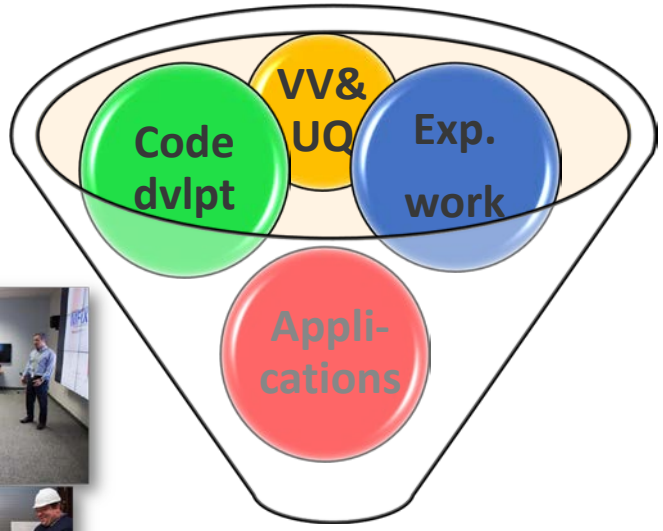
August 10, 2017

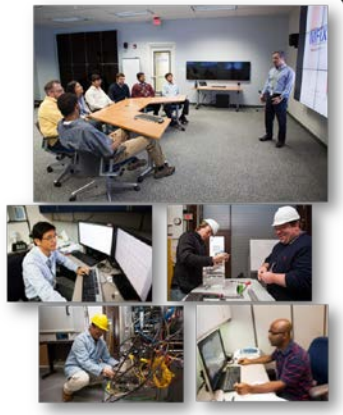
Solutions for Today | Options for Tomorrow

U.S. DEPARTMENT OF ENERGY

NETL Multiphase Flow Science Team

NETL Multiphase Flow Science
Home of the MFiX Software Suite.
https://mfix.netl.doe.gov





MFiX

Optimization Toolset

C3M™ Carbonaceous Chemistry for Computational Modeling

Experimental Data

MFS Team

Arthur Konan
Avinash Vaidheeswaran
Aytekin Gel
Balaji Gopalan
Christopher Guenther
David Huckaby
Dirk VanEssendelft
Greggory Breault
Huda Ashfaq
Hyoungkeun Kim
Janine Carney
Jeff Dietiker
Jonathan Tucker
Jonny Higham
Jordan Musser
Justin Finn
Justin Weber
Kisoo Yoo
Kyle Buchheit
Liqiang Lu
Madhava Syamlal
Mark Meredith
Mary Ann Clarke
Mehrdad Shahnam
Pankaj Saha
Rupen Panday
Sofiane Benyahia
Subhodeep Banerjee
Terry Jordan
Tingwen Li
William A.Rogers
William D. Fullmer
Xi Gao
Yupeng Xu

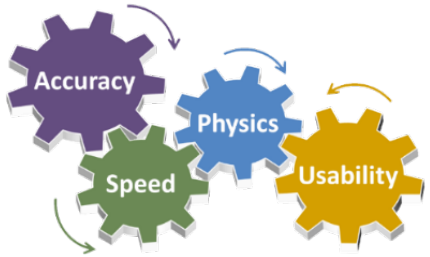
MFiX 17.1

Special thanks to GUI team:
Justin Weber
Mark Meredith
Charles Waldman
and
Jordan Musser

MFIX Development Activities

17.1 Release (July 2017), focus on usability

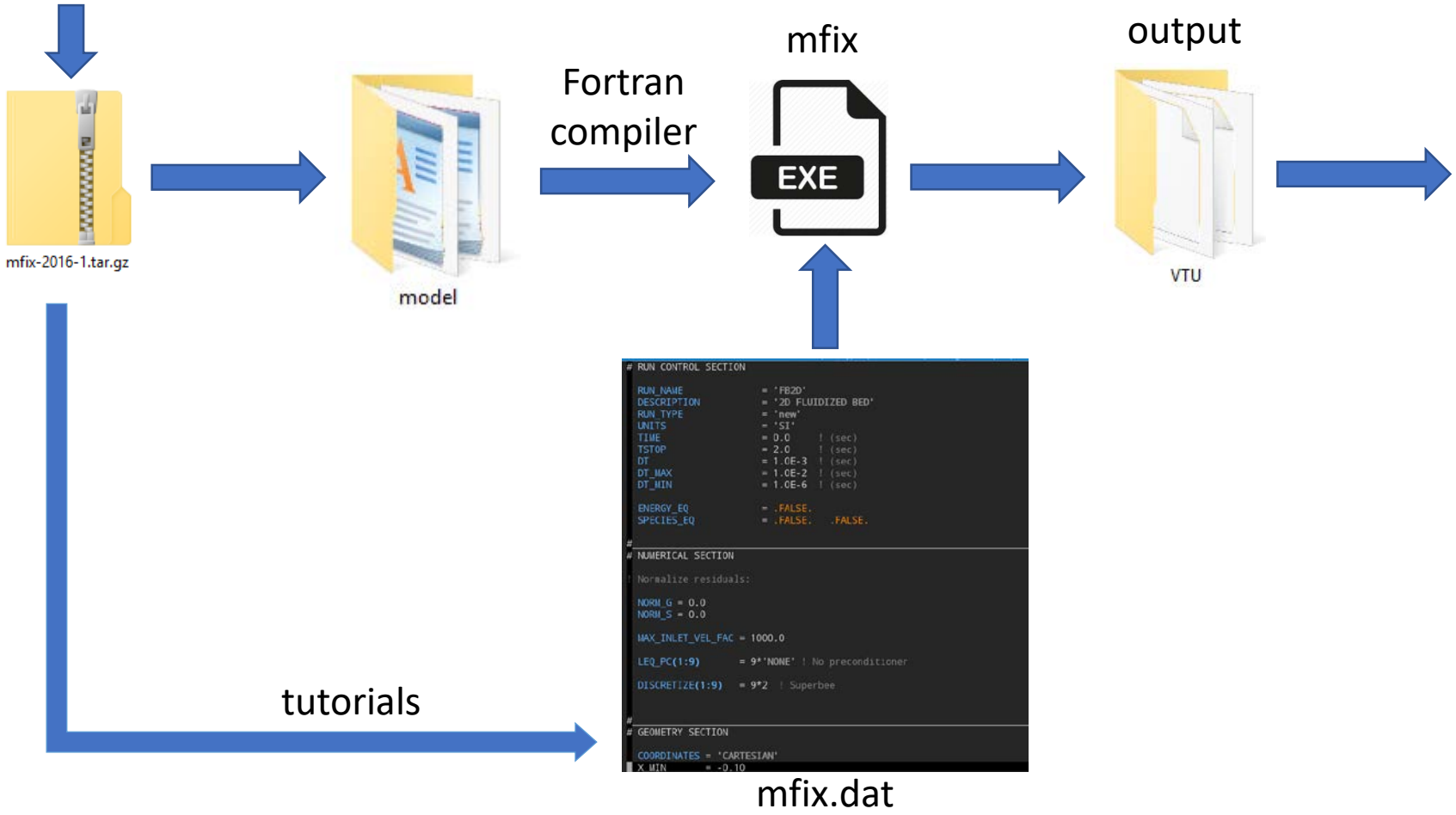
- **Graphical User Interphase** (GUI) completely redesigned
- Works on Linux, macOS, Windows (same look and feel)
- Guided creation of setup
- Interact with solver (pause/modify setting/resume)
- Basic visualization
- Build custom solver from GUI
- Submit jobs to queue system
- Tutorials (video and text)
- Sample simulation setup

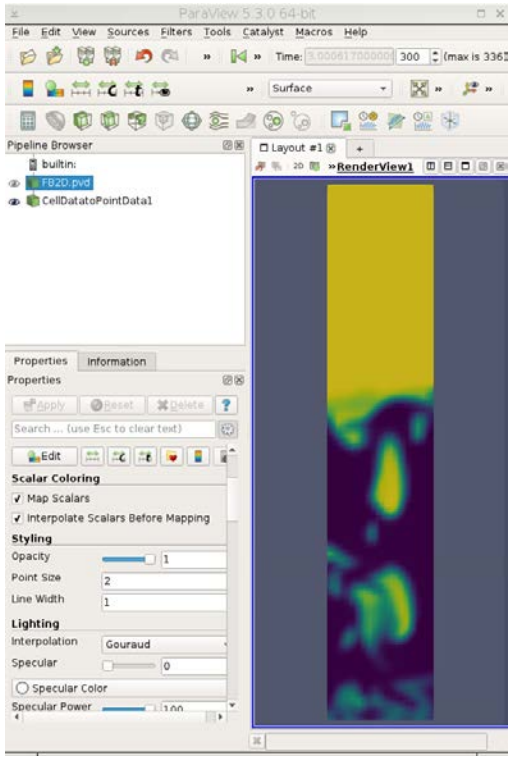


- Beta release in Spring 2017
- Official release in Summer 2017

MFiX 16.1 and prior versions

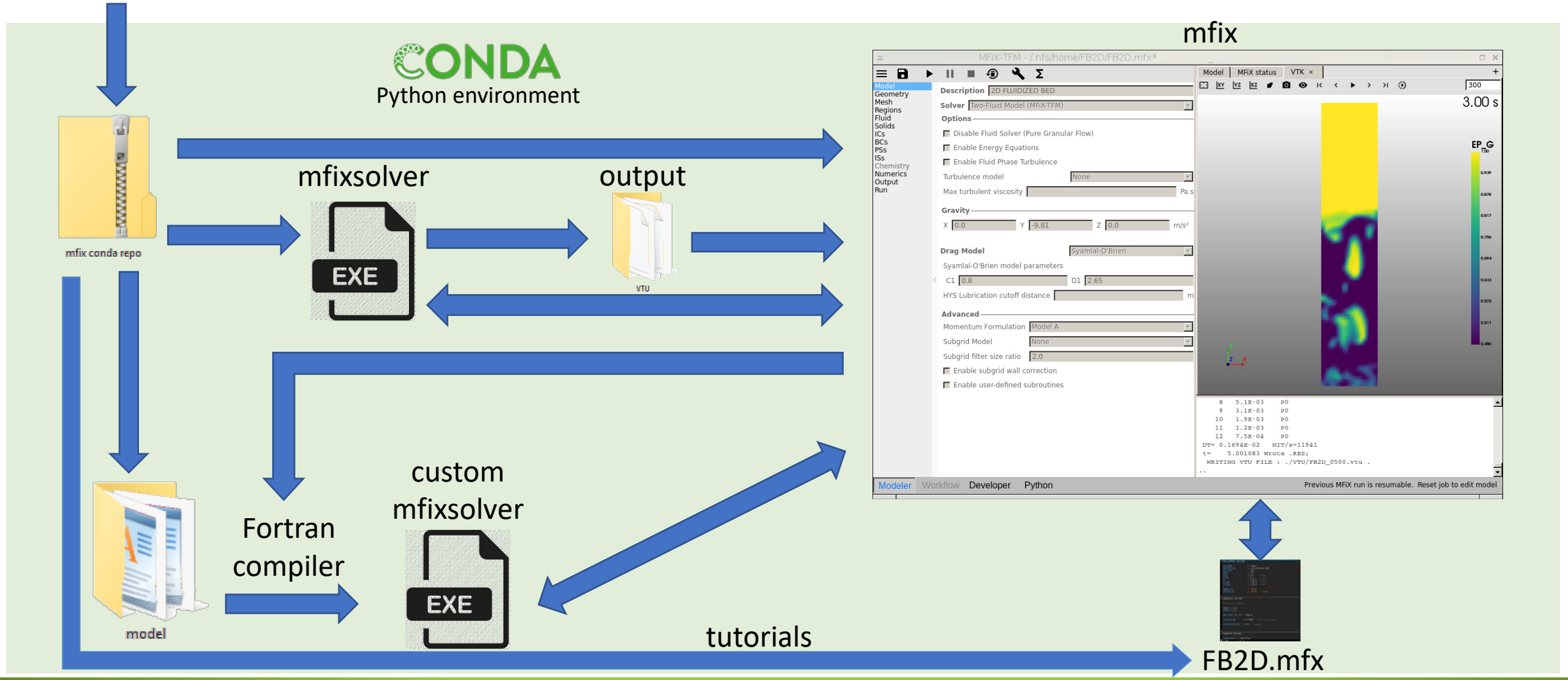
NETL Multiphase Flow Science
Home of the MFiX Software Suite.
https://mfix.netl.doe.gov





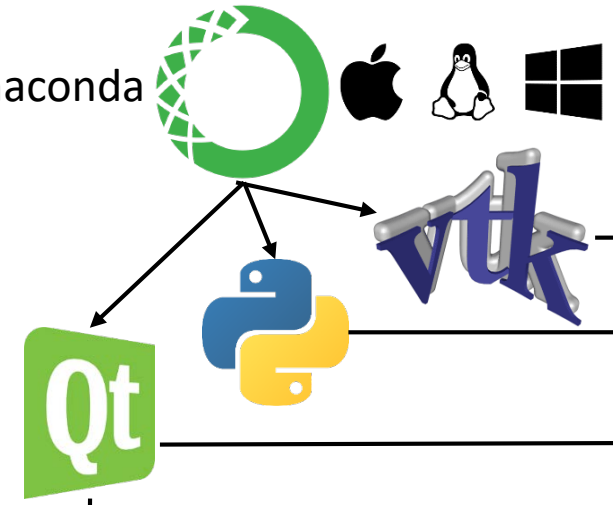
MFiX 17.1 release

https://mfix.netl.doe.gov

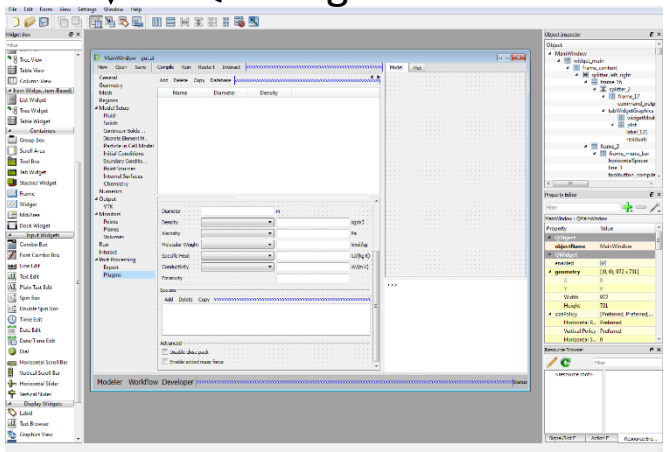


Dependencies

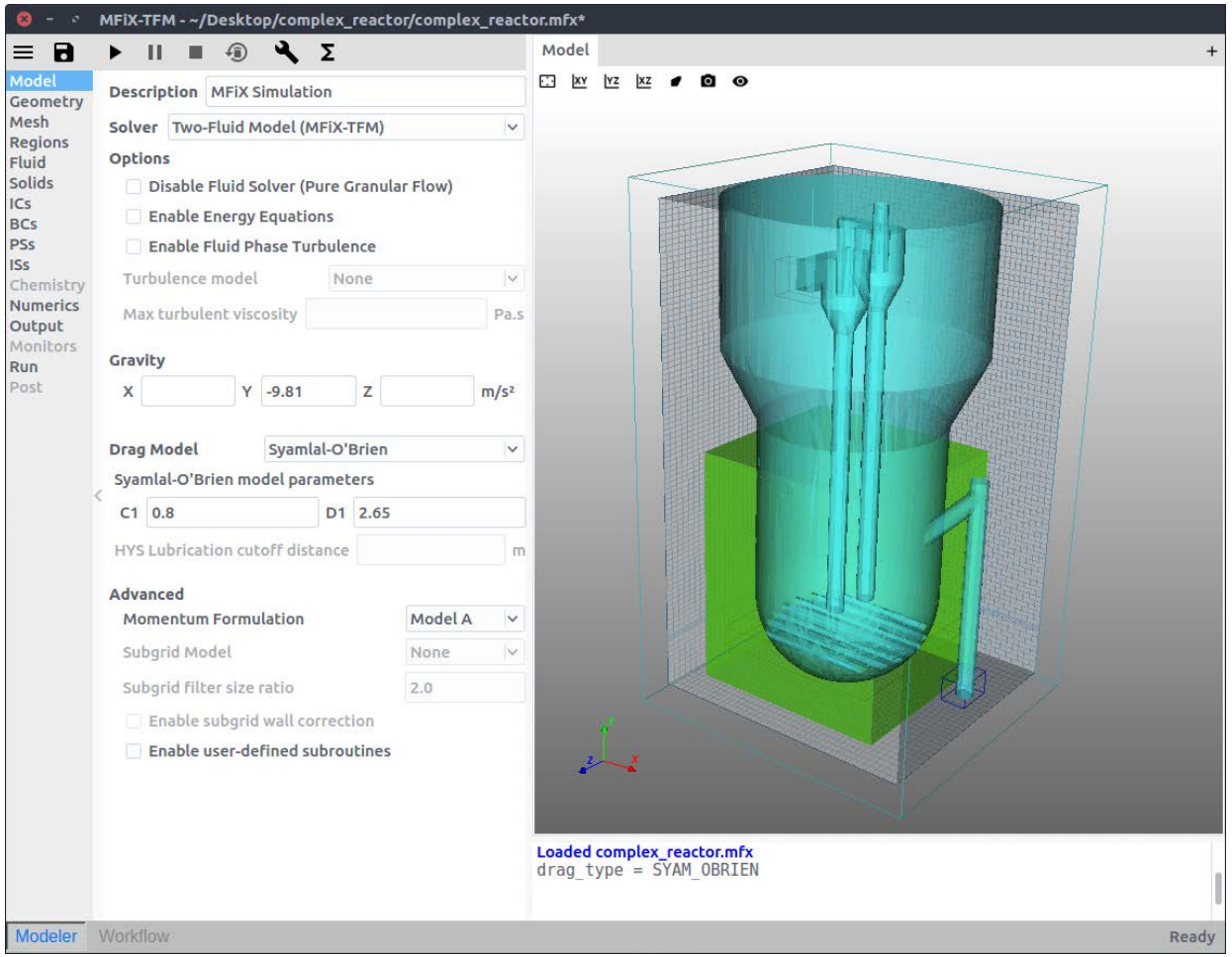
Anaconda



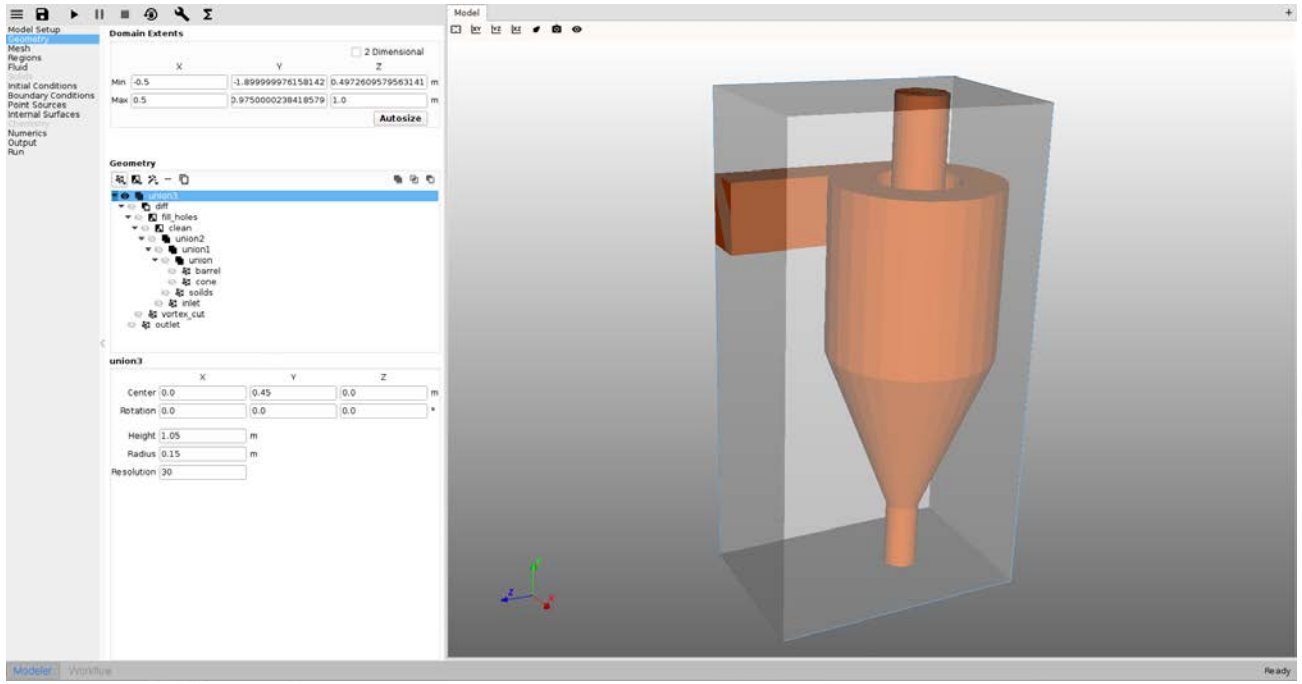
Qt designer

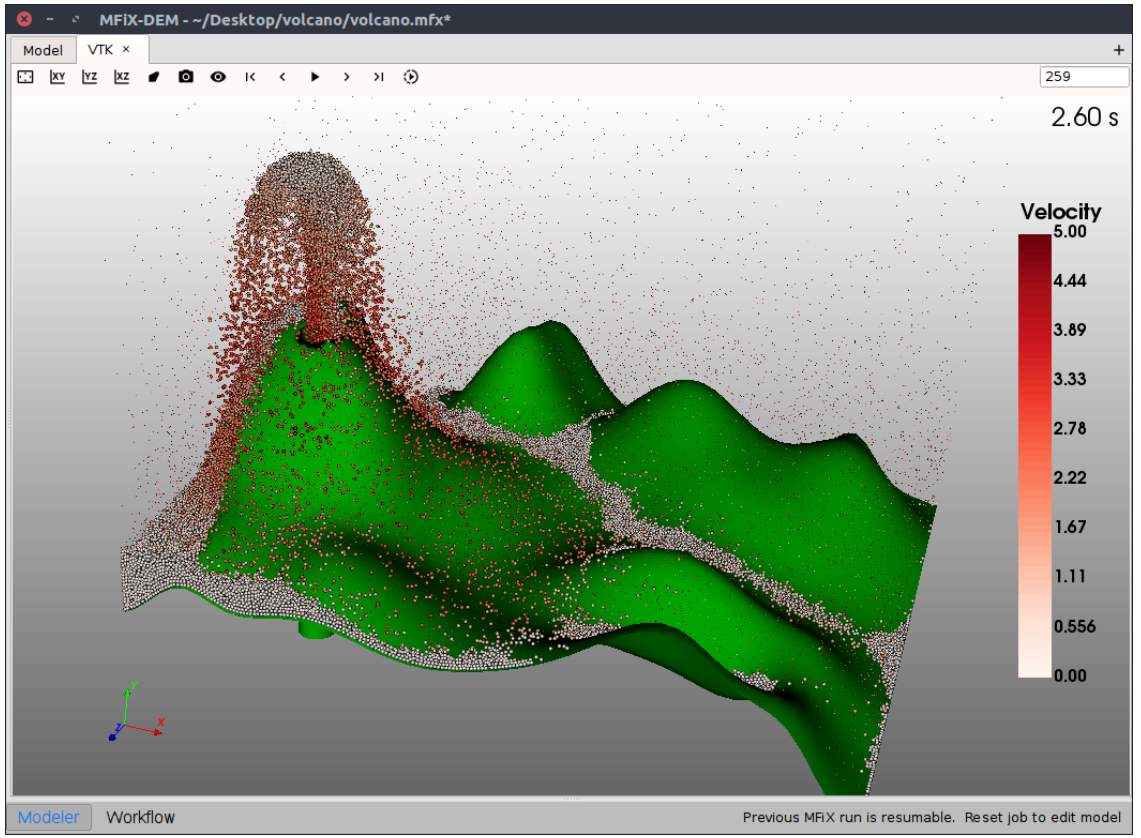


UI Files

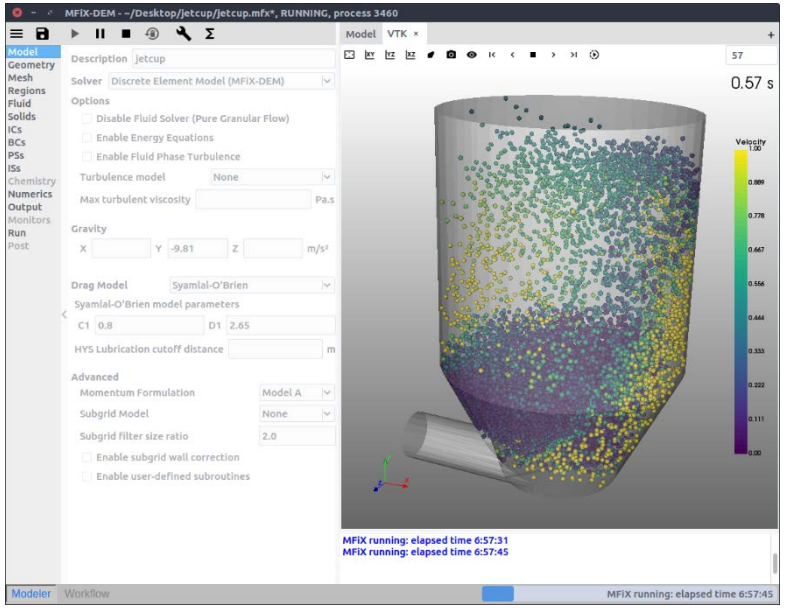


3D Graphics


Model Setup
Geometry
Mesh
Regions
Fluid
Initial Conditions
Boundary Conditions
Point Sources
Internal Surfaces
Numerics
Output
Run
Domain Extents
2 Dimensional
Autosize
Geometry
union3
Center
Rotation
Height
Radius
Resolution
Model
Modeler
Workflow
Ready


MFiX-DEM - ~/Desktop/volcano/volcano.mfx*
Model
VTK
259
2.60 s
Velocity
5.00
4.44
3.89
3.33
2.78
2.22
1.67
1.11
0.556
0.00
Modeler
Workflow
Previous MFiX run is resumable. Reset job to edit model

pyMFiX



GUI

HTTP

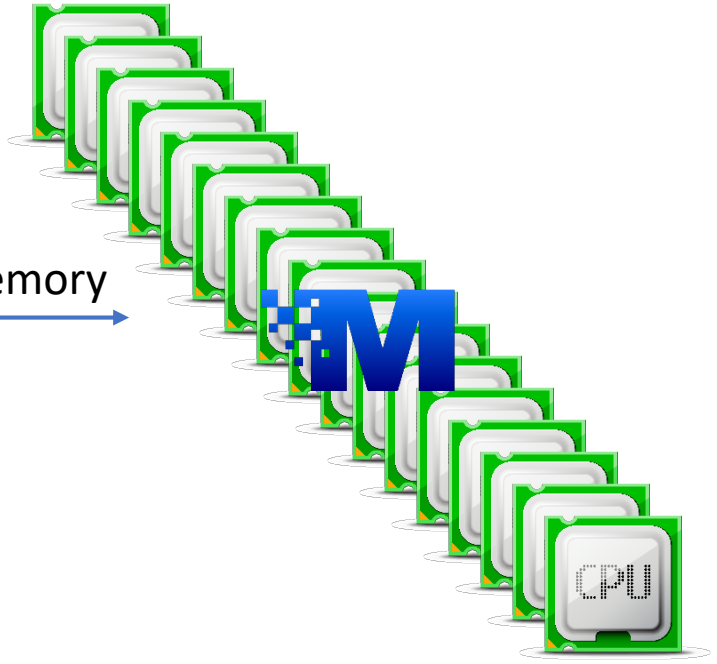
Node

Model Parameters

pymfix

Status, Residuals, Results

In memory

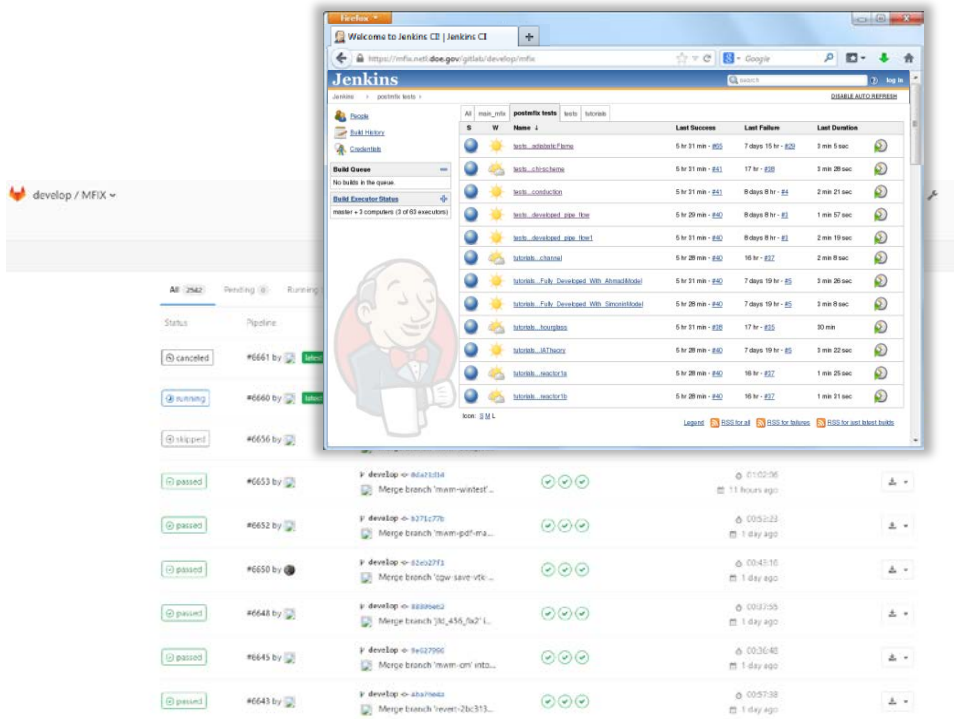


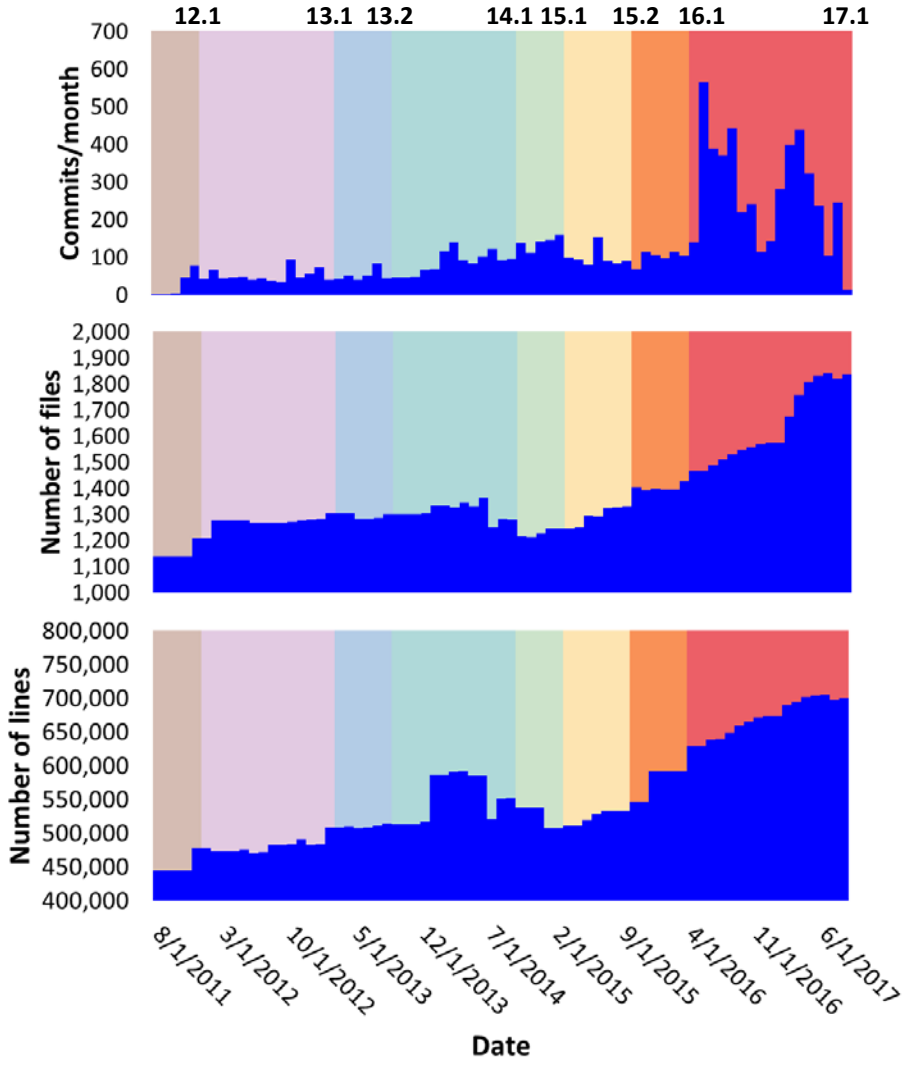
Python wrapped MFiX
Flask Webserver

Fortran MFiX

MFiX development over time

Continuous integration server integrated with version control for testing/QA

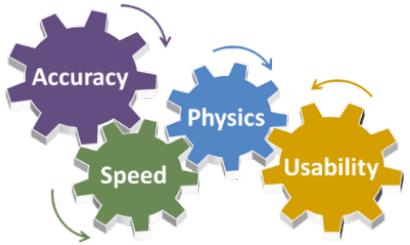


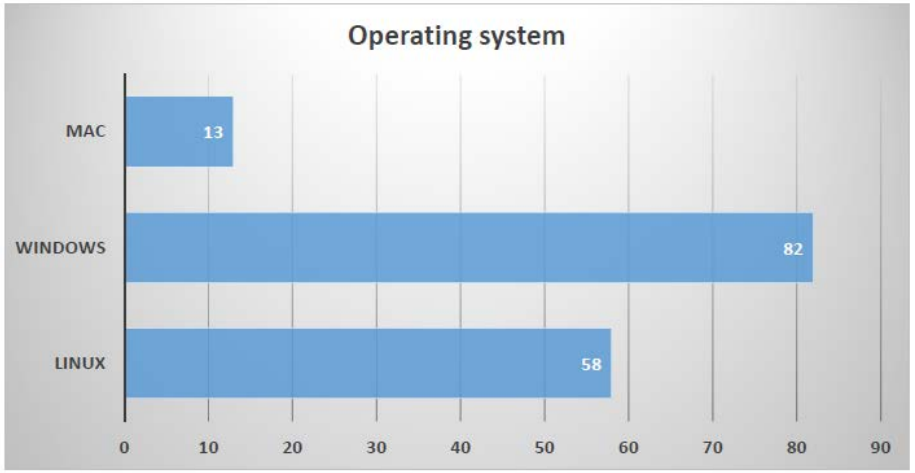


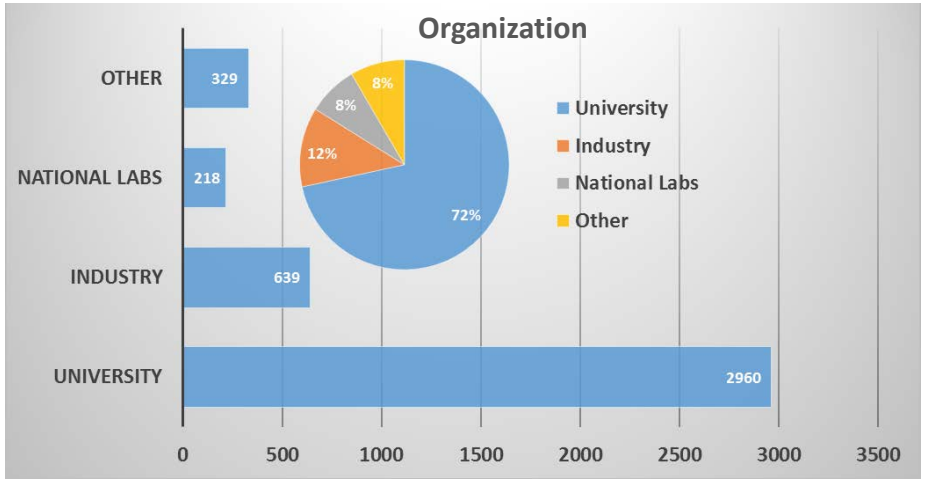
MFIX User Community

Motivation: Better serve MFiX community

- Improve usability of MFiX
- Support Linux, macOS and Windows OS
- Decrease time to setup, reduce error

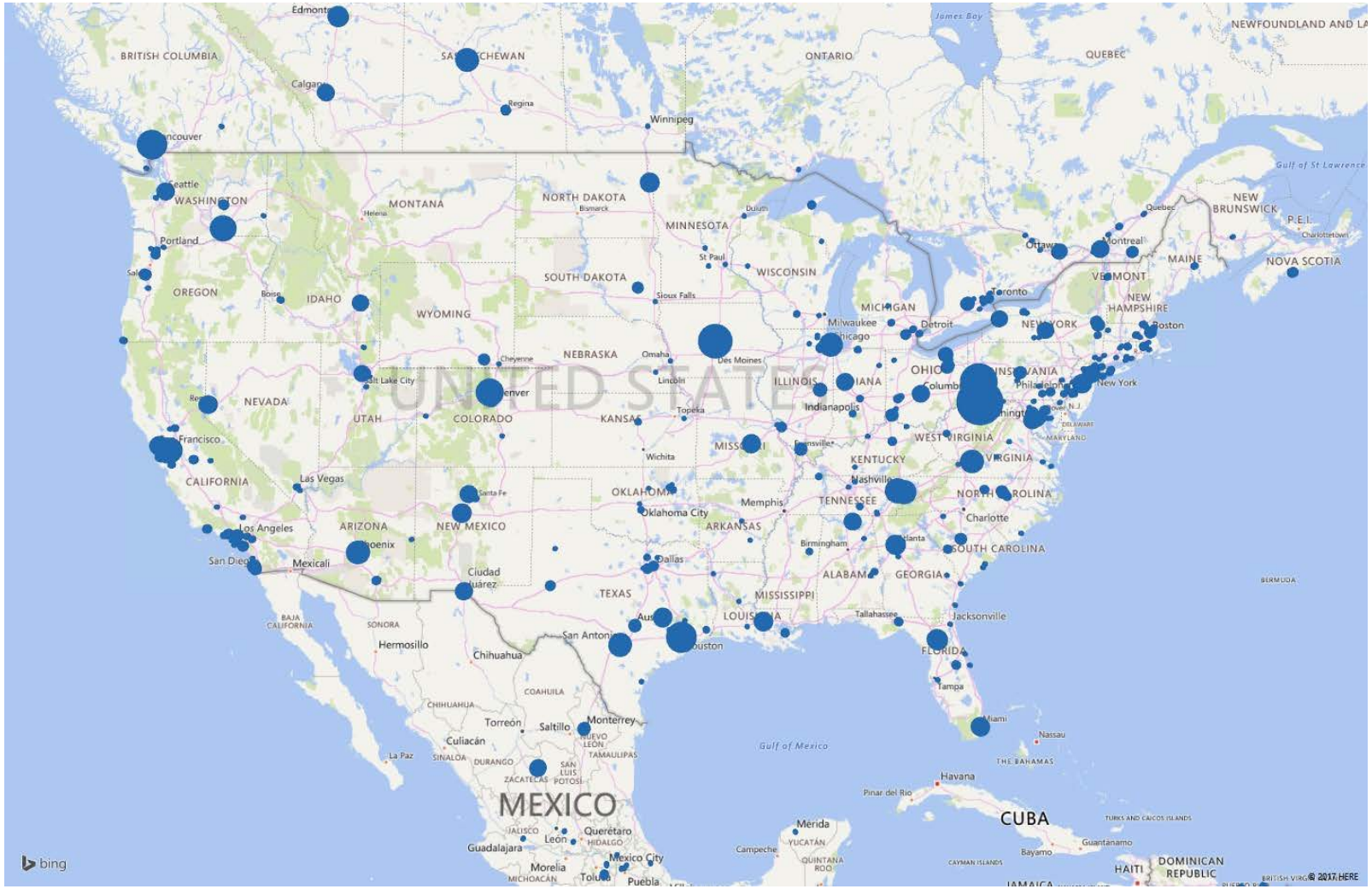




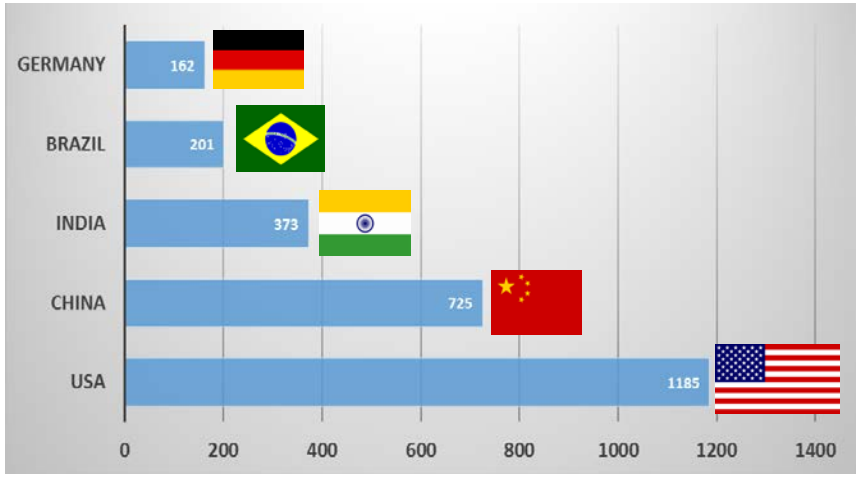


MFIX User Community Statistics

4,500+ all-time MFIX registrations



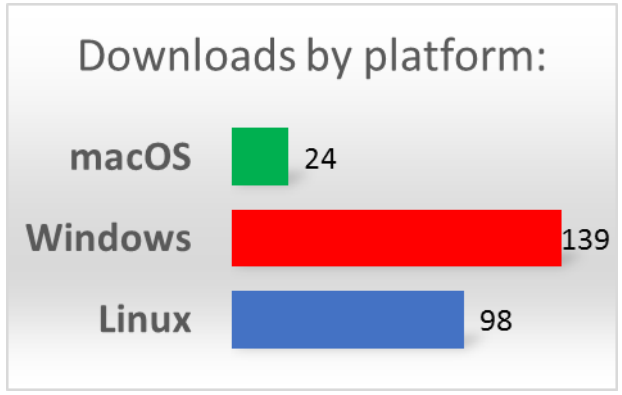
Top 5 Countries



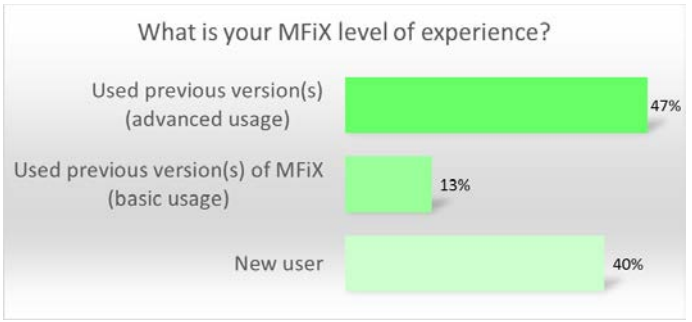
MFiX 17.1 beta testing phase

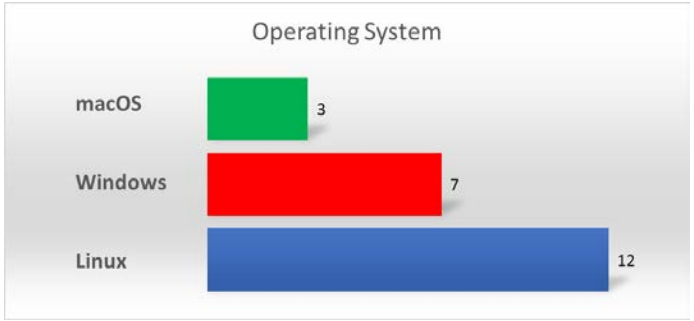
Beta testing phase (May-July 2017)

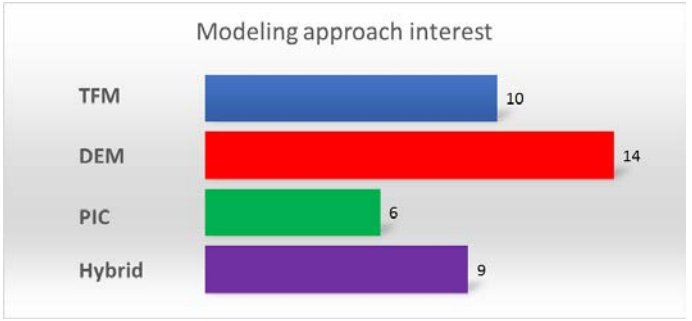
- 159 users signed up
- 261 total MFiX downloads
- Valuable feedback received from representative pool of users

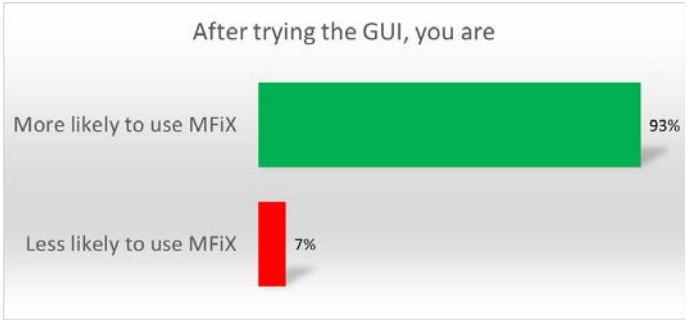


Beta testing Survey





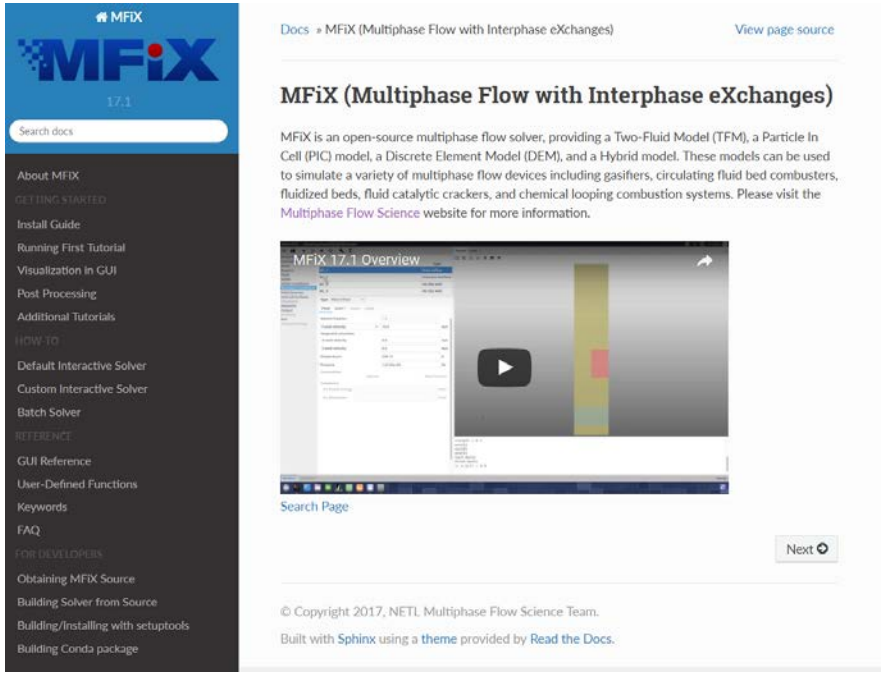




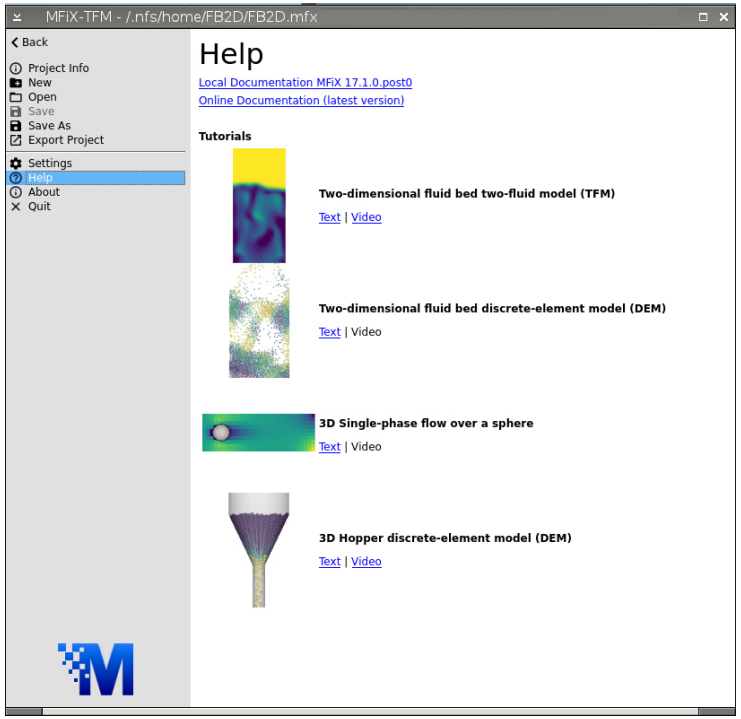
MFiX 17.1 – How to get started

1. Register at https://mfix.netl.doe.gov (skip if MFiX member)
2. Install Miniconda on your platform (one-time installation)
3. Optional but recommended: Install Fortran compiler for UDFs: one conda command
4. Install mfix: one conda command
5. Launch mfix

Online documentation:
https://mfix.netl.doe.gov/doc
With video and text tutorials



Access documentation from GUI



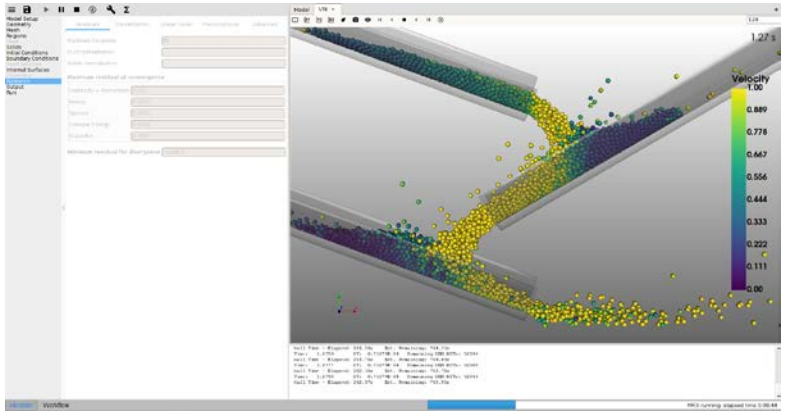
MFiX Development Activities

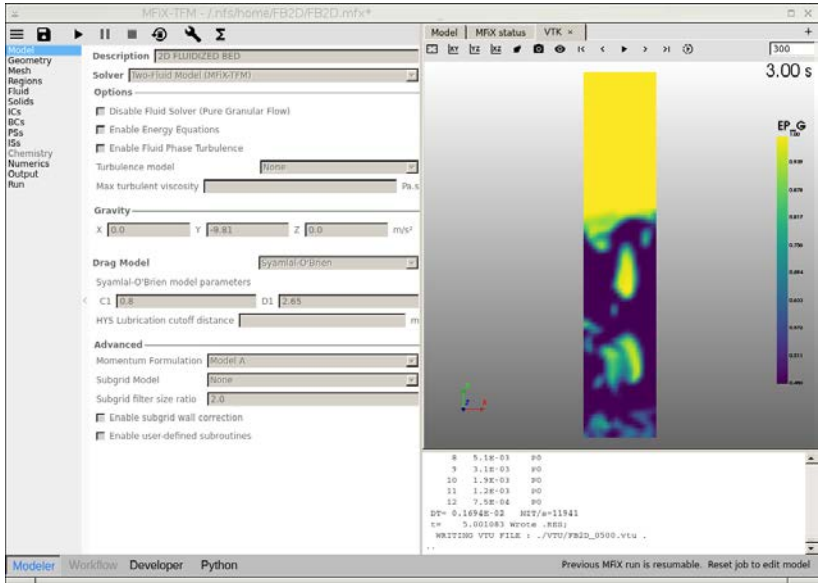
Future development (tentative):

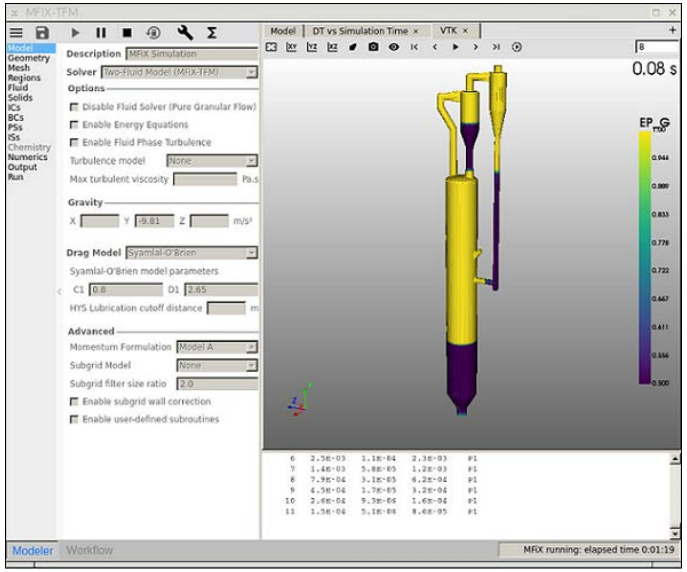
- 17.2 Release (October 2017):
  - Workflow integration
  - Monitors
  - Point sprites (VTK>=7)
  - Faster Windows build
  - Support Intel compiler
  - Terminal entry for advanced users
  - Add Collection of common UDFs (rotating gravity, …)
  - Minimal text editor
- 17.3 Release (December 2017)
  - Write usr_rates file from GUI
  - Support for coarse grain DEM model
- 18.1 Release (Spring 2018):
  - Mesh from the GUI
  - Calibrate Syamlal-O'Brien drag from GUI
  - Edit particle_input.dat + visualize particles
- 18.2 Release (Fall 2018):
  - Improved PIC model
- 19.1 Release (Spring 2019):Exa support

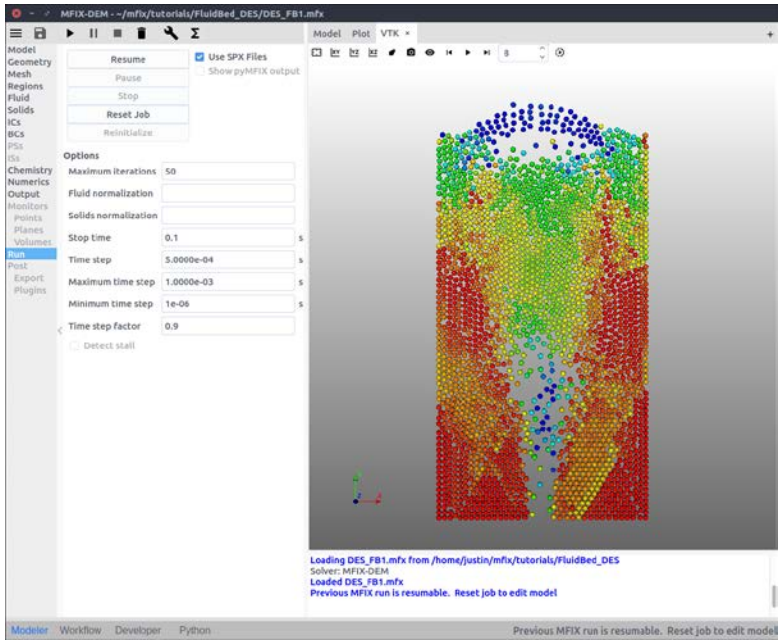
Please send feedback, questions, suggestions to mfix-help@mfix.netl.doe.gov

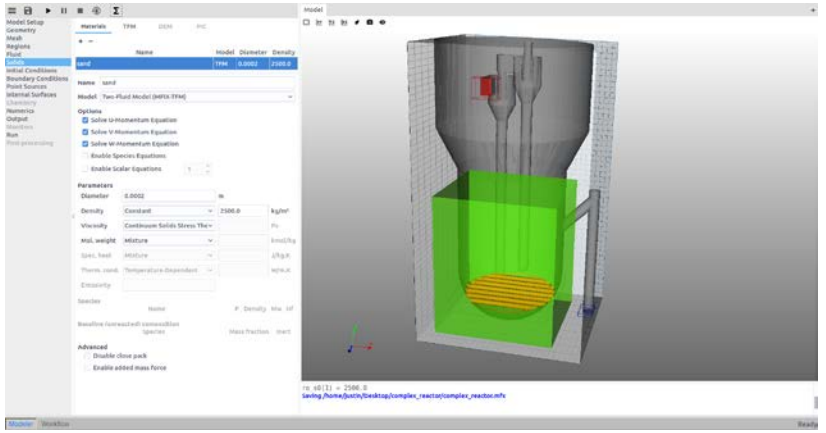
MFiX 17.1 gallery

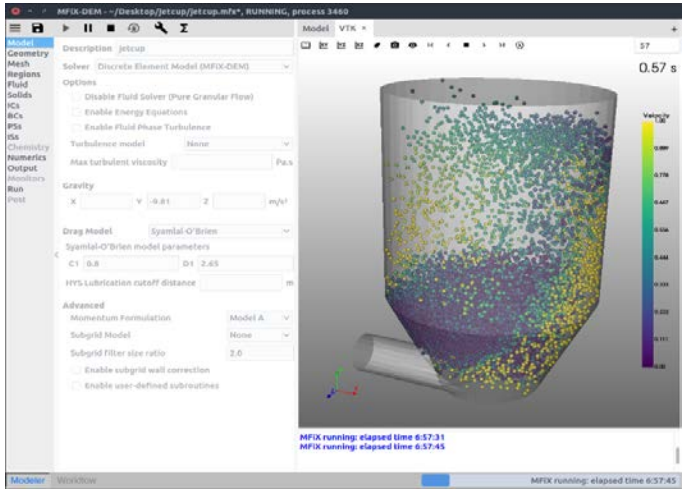


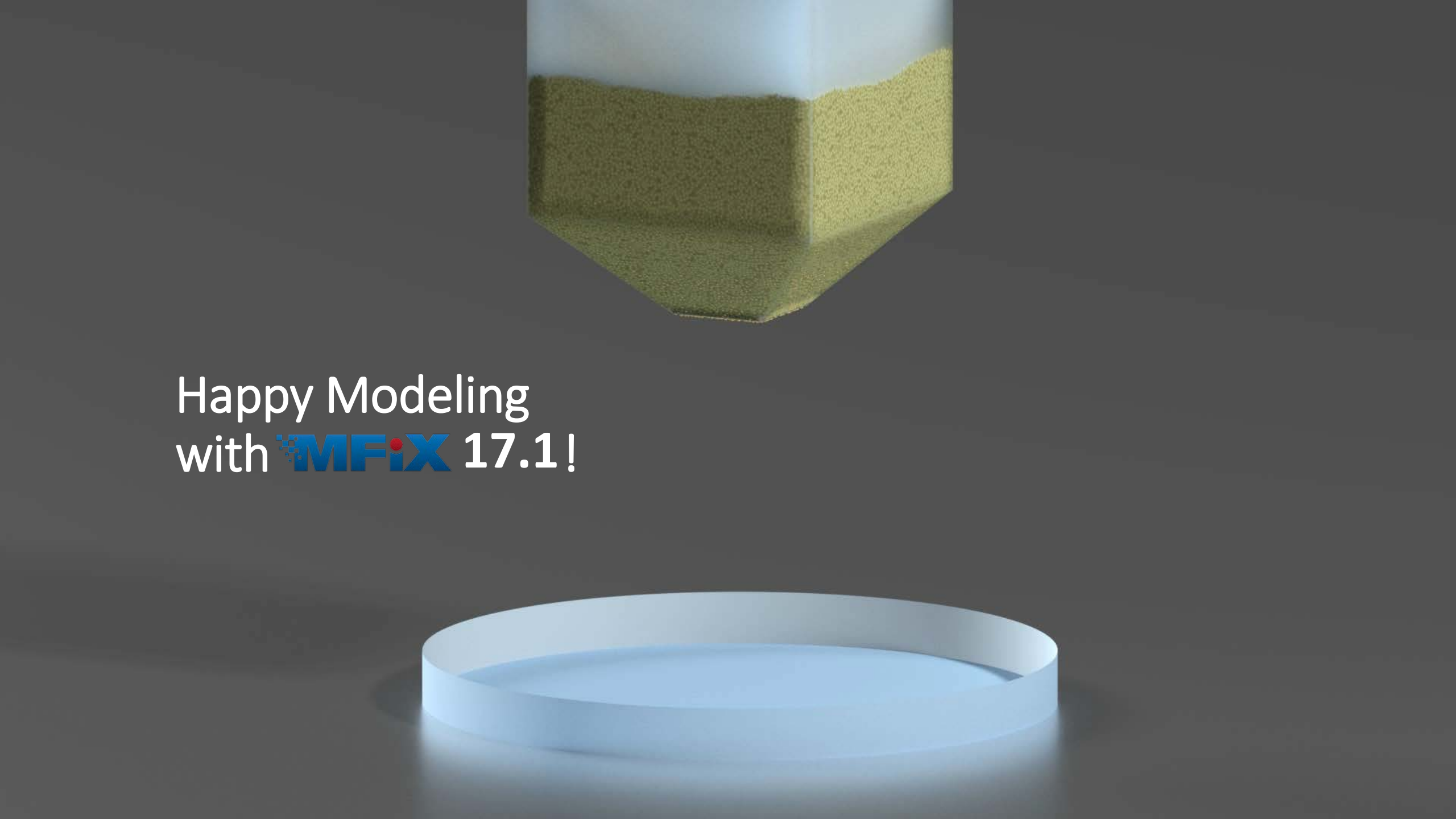











Happy Modeling
with MFiX 17.1!