



MFiX

17.1 Release

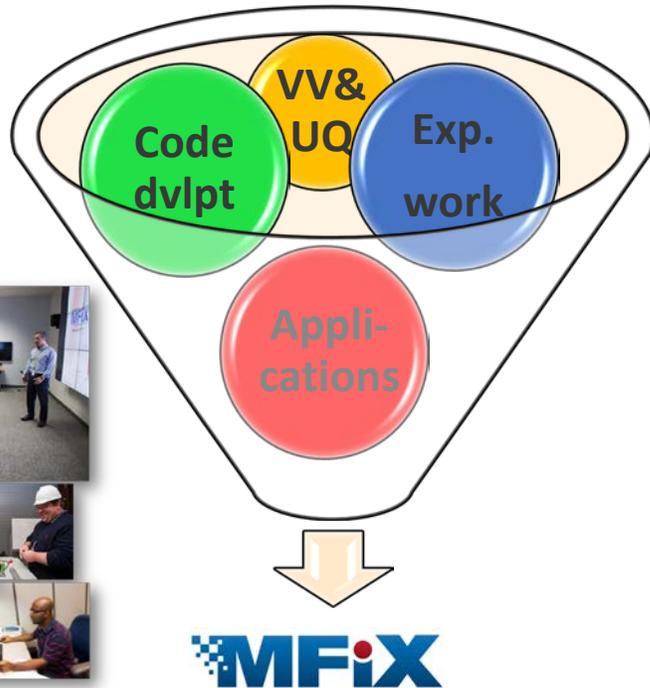
Jeff Dietiker, Justin Weber
Multiphase Flow Science Group

August 10, 2017



NETL Multiphase Flow Science Team

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



Optimization
Toolset

Experimental
Data

MFS Team

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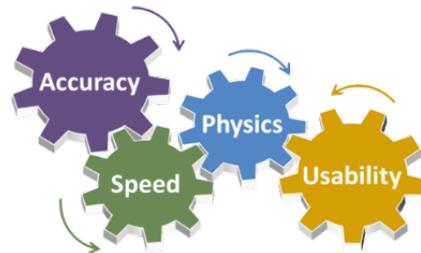
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MFiX 17.1

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

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



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mfix-2016-1.tar.gz



model

Fortran
compiler

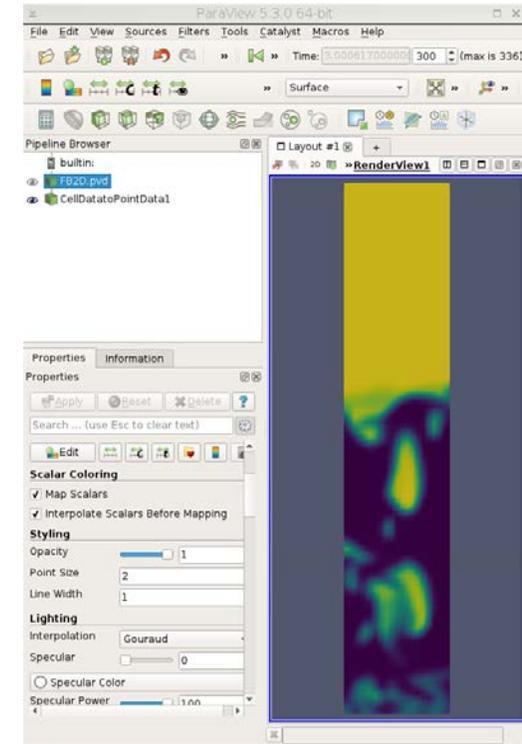


mfix



output

VTU



tutorials

```
# RUN CONTROL SECTION
RUN_NAME      = 'FB2D'
DESCRIPTION   = '2D FLUIDIZED BED'
RUN_TYPE      = 'New'
UNITS         = 'SI'
TIME          = 0.0      ! (sec)
TSTOP         = 2.0      ! (sec)
DT            = 1.0E-3    ! (sec)
DT_MAX        = 1.0E-2    ! (sec)
DT_MIN        = 1.0E-6    ! (sec)
ENERGY_EQ     = .FALSE.
SPECIES_EQ    = .FALSE. .FALSE.

# NUMERICAL SECTION
Normalize residuals:
NORM_G = 0.0
NORM_S = 0.0
MAX_INLET_VEL_FAC = 1000.0
LEQ_PC(1:9) = 9* 'NONE' ! No preconditioner
DISCRETIZE(1:9) = 9*2 ! Superbee

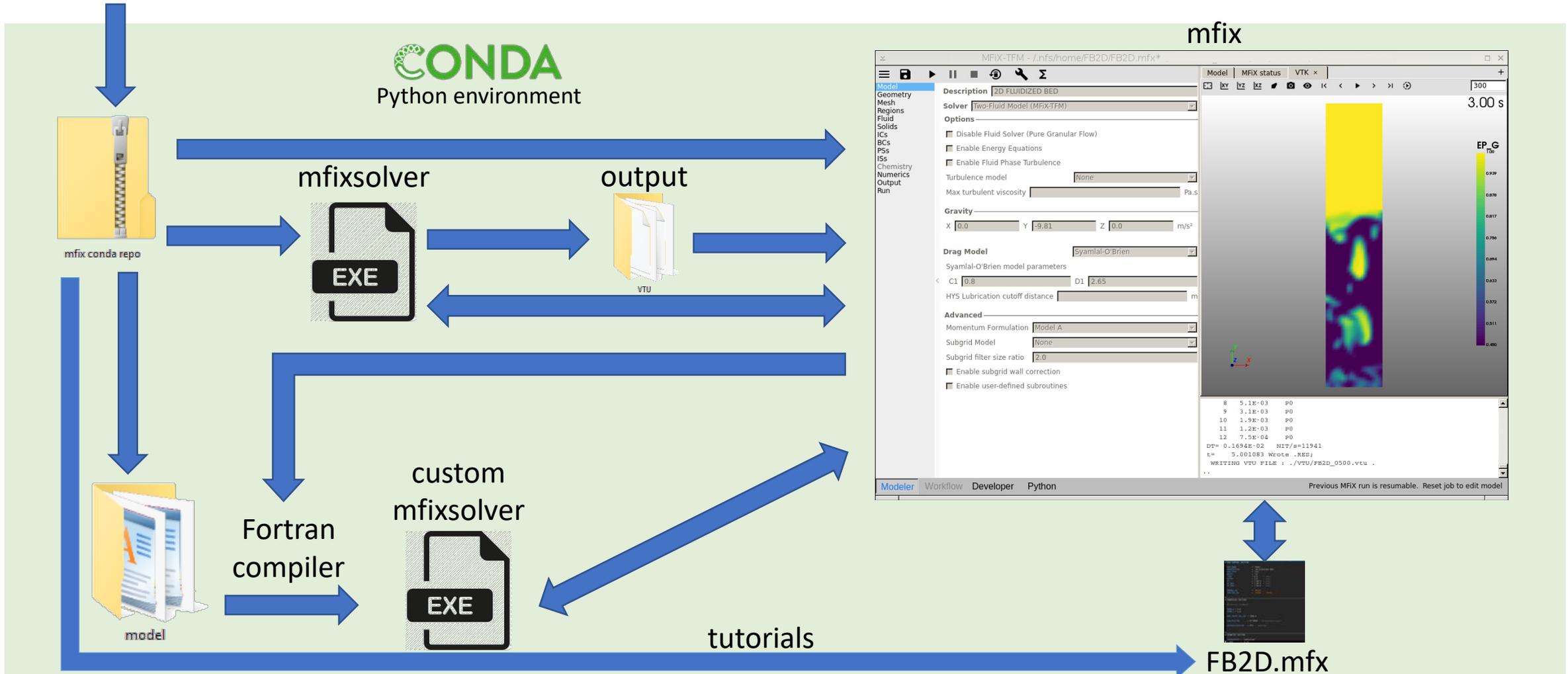
# GEOMETRY SECTION
COORDINATES = 'CARTESIAN'
X MIN       = -0.10
```

mfix.dat

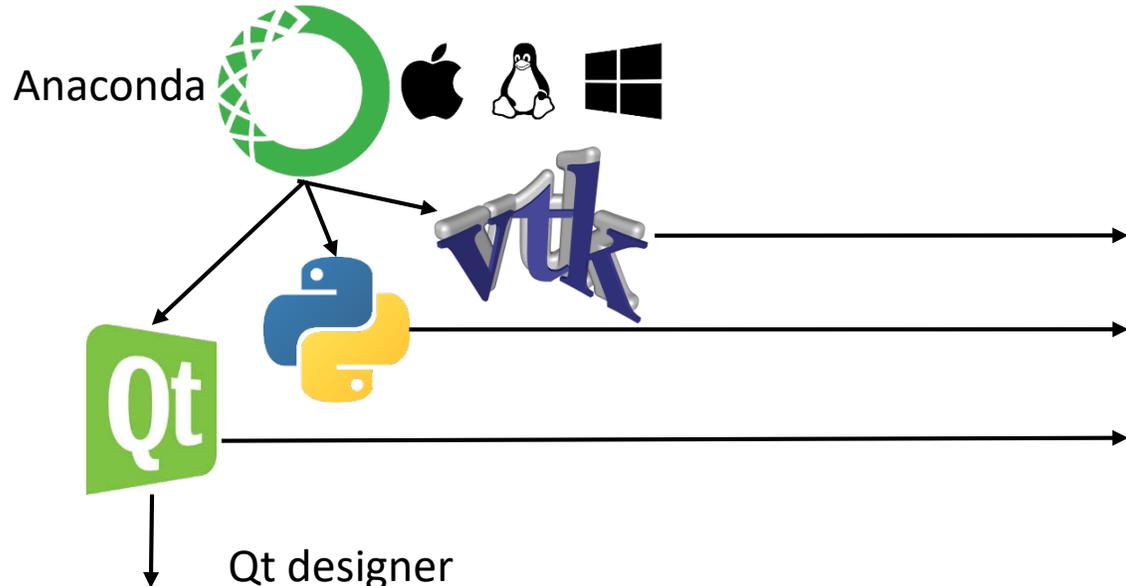
MFiX 17.1 release



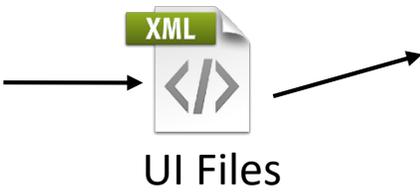
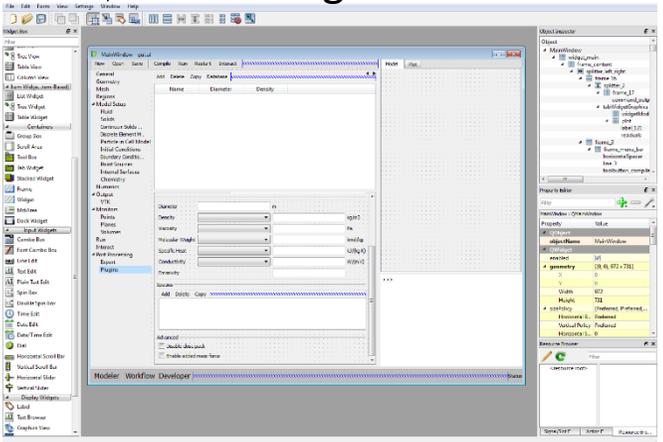
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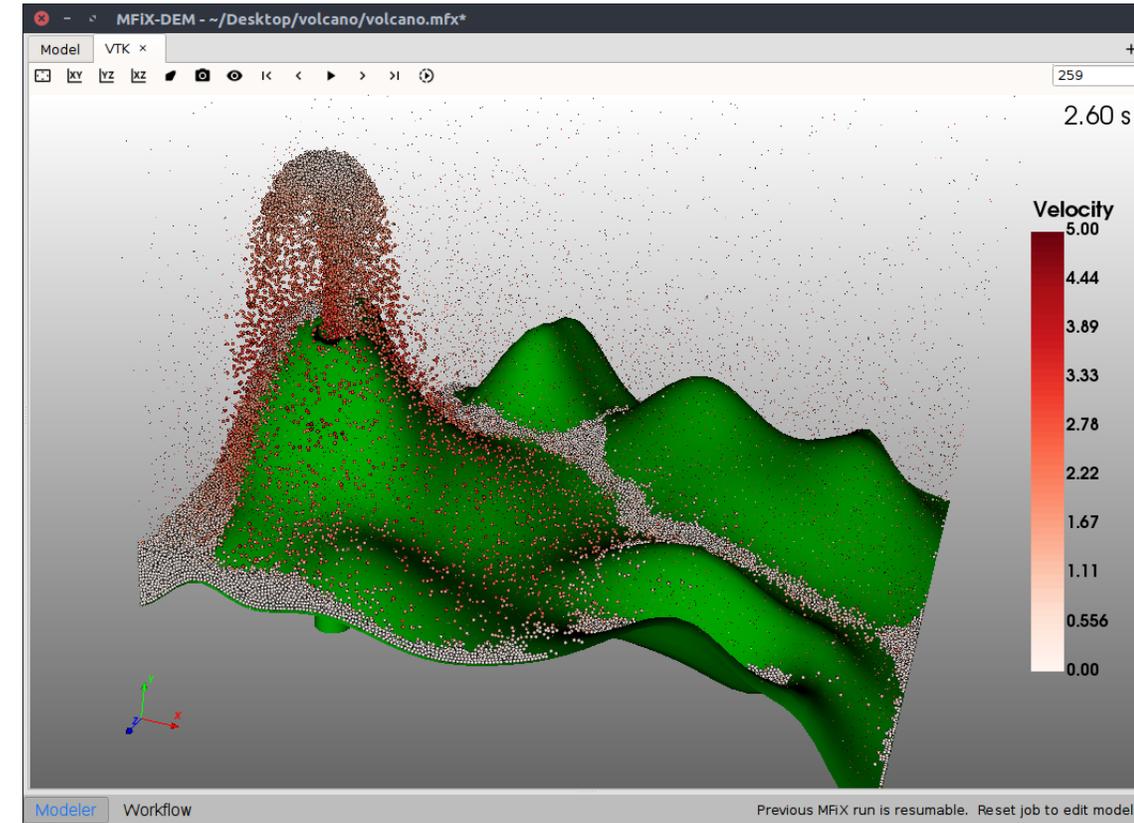
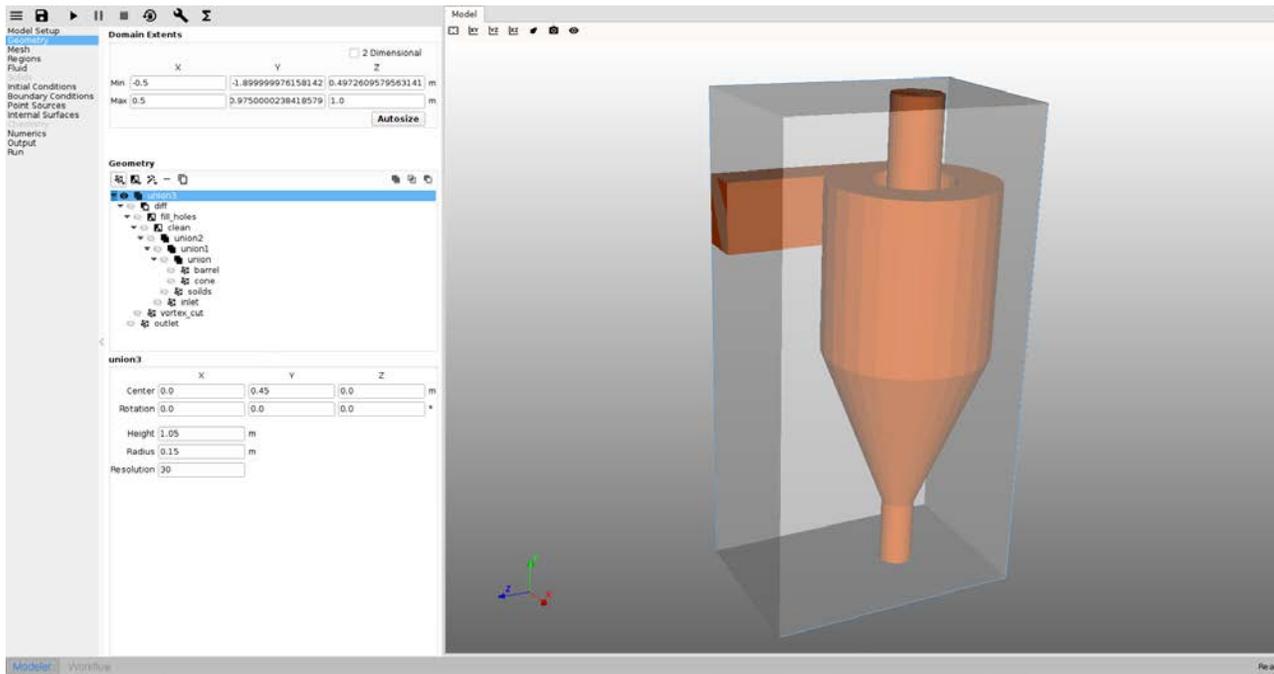


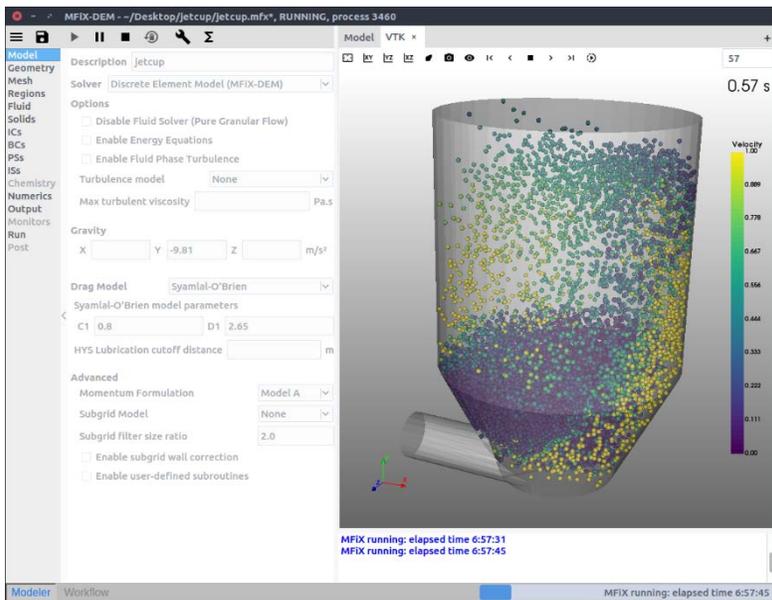
Dependencies



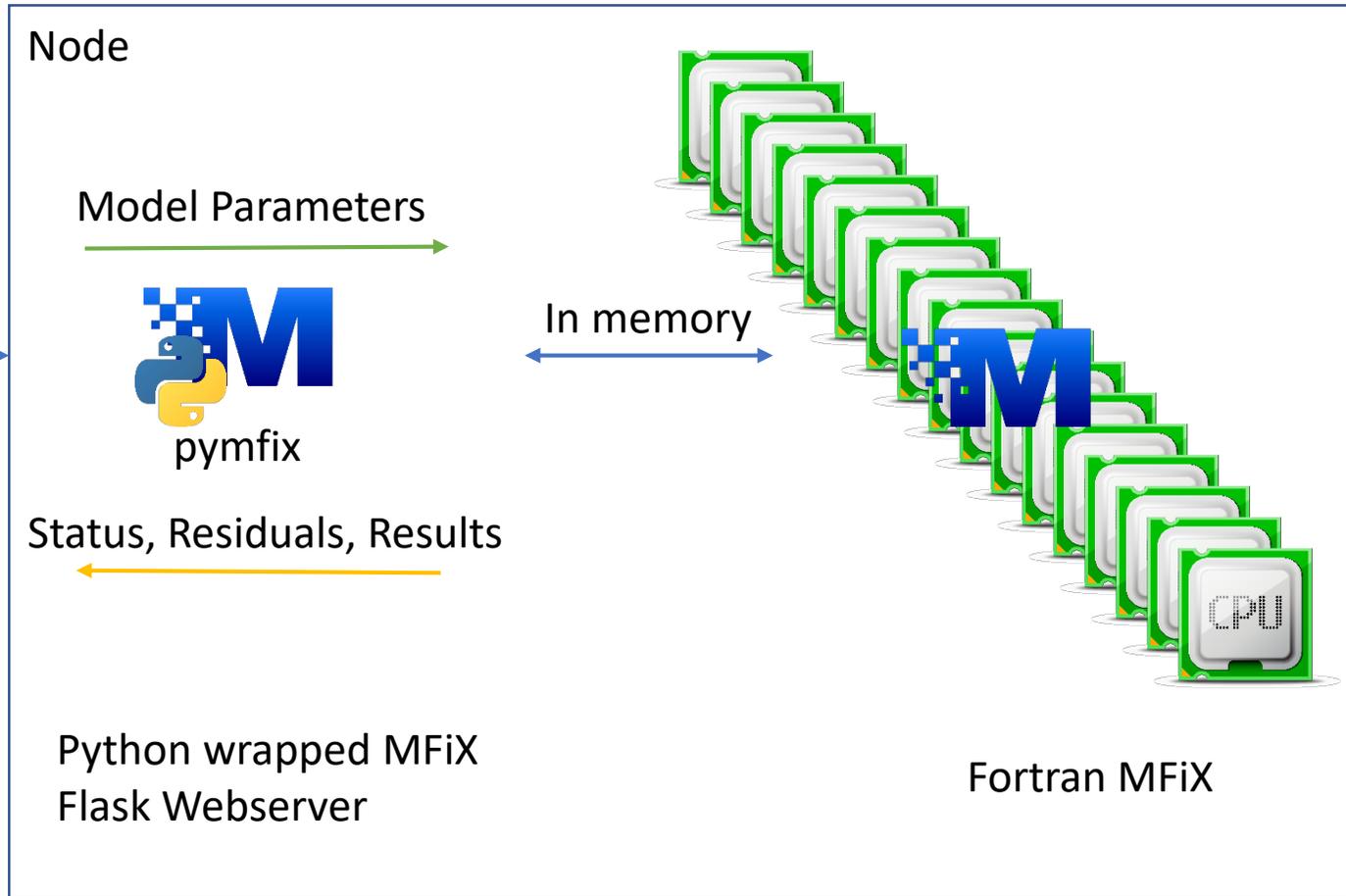
The screenshot displays the MFiX-TFM software interface. On the left is a sidebar menu with categories like Model, Geometry, Mesh, Regions, Fluid, Solids, ICs, BCs, PSs, ISS, Chemistry, Numerics, Output, Monitors, Run, and Post. The main window shows simulation parameters for a 'Two-Fluid Model (MFiX-TFM)'. Key parameters include: Gravity (X, Y: -9.81, Z: m/s²), Drag Model (Syamlal-O'Brien), Syamlal-O'Brien model parameters (C1: 0.8, D1: 2.65), and HYS Lubrication cutoff distance. The right side of the window shows a 3D visualization of a reactor vessel with a central column and a bottom agitator. Below the visualization, text reads: 'Loaded complex_reactor.mfx drag_type = SYAM_OBRIEN'. The status bar at the bottom indicates 'Modeler Workflow Ready'.





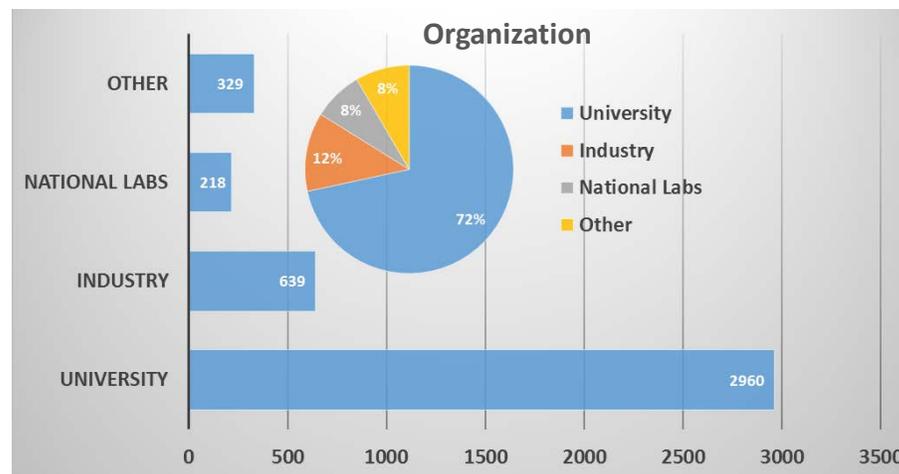
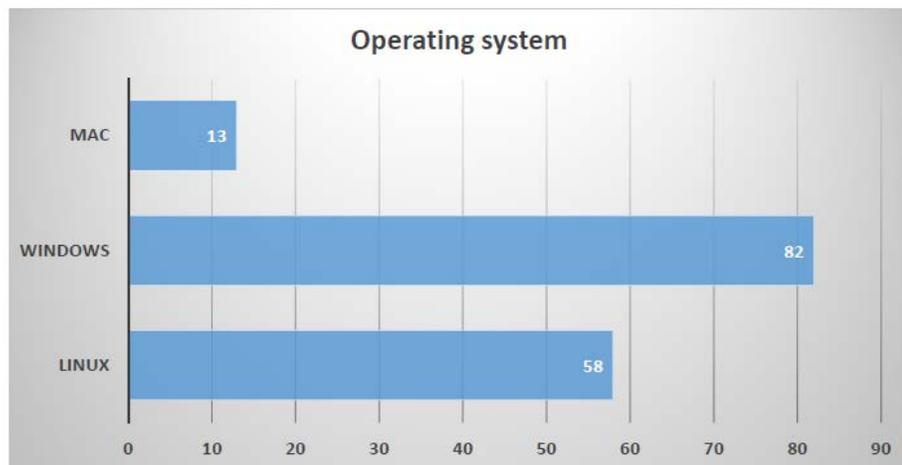
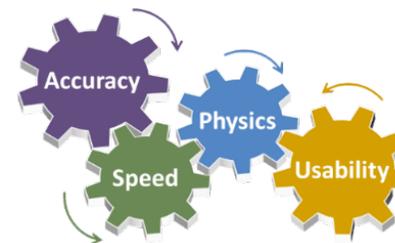


GUI



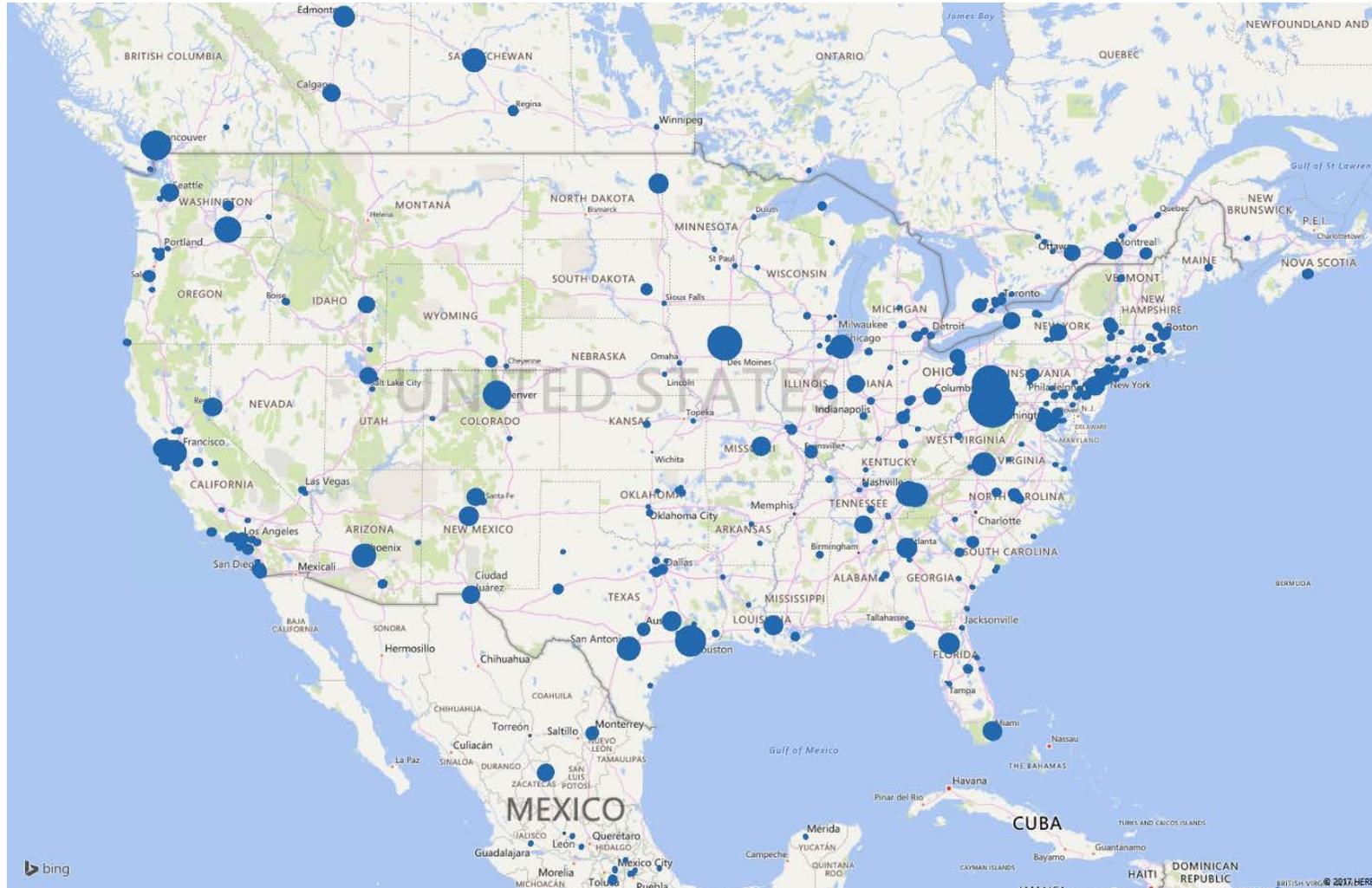
Motivation: Better serve MFiX community

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

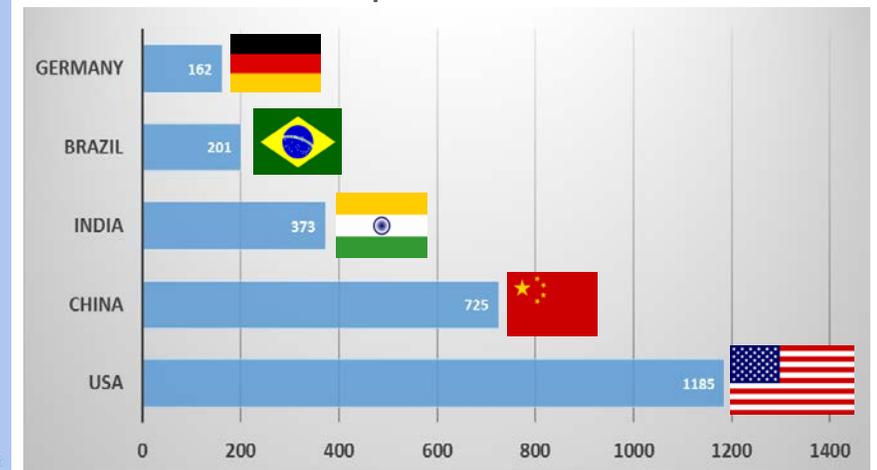


MFIX User Community Statistics

4,500+ all-time MFIX registrations

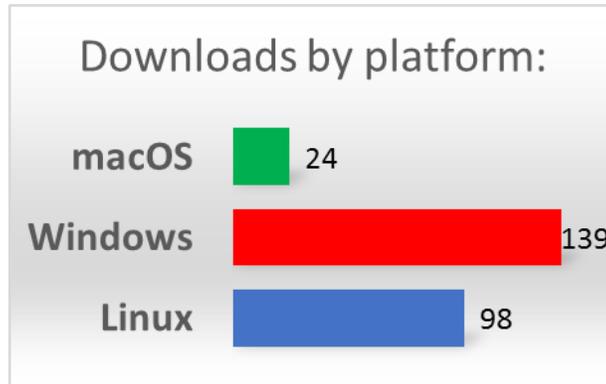


Top 5 Countries

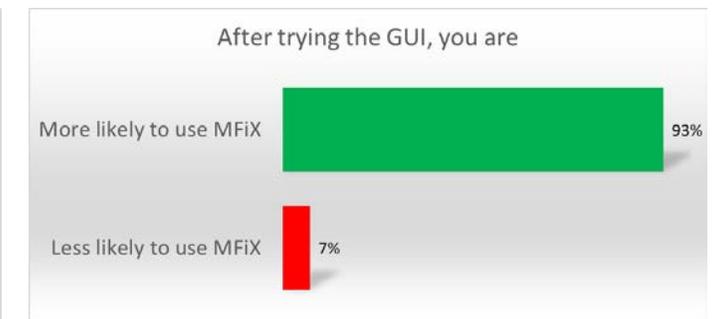
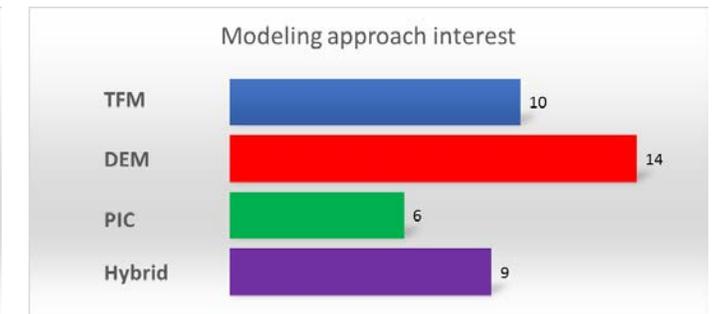
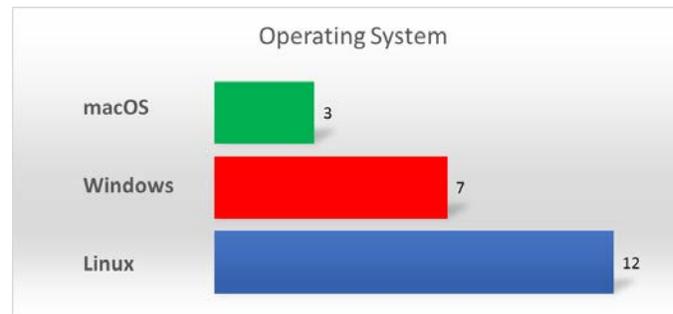
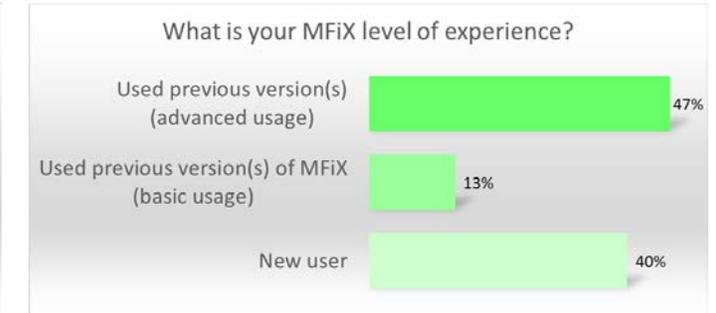
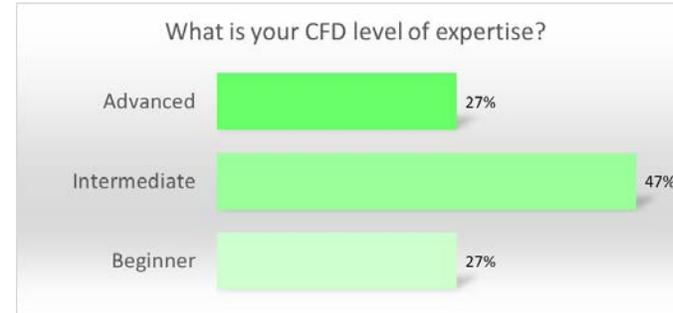


Beta testing phase (May-July 2017)

- 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

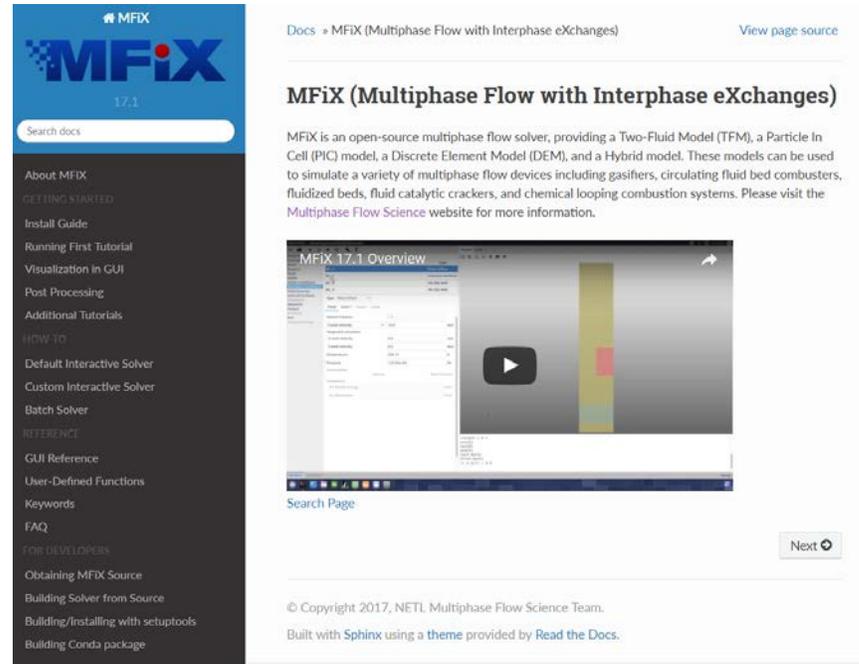
1. Register at <https://mfix.netl.doe.gov> (skip if MFiX member)
2. Install Miniconda on your platform (one-time installation)
3. Optional but recommended: Install Fortran compiler for UDFs: one conda command
4. Install mfix: one conda command
5. Launch mfix

Online documentation:

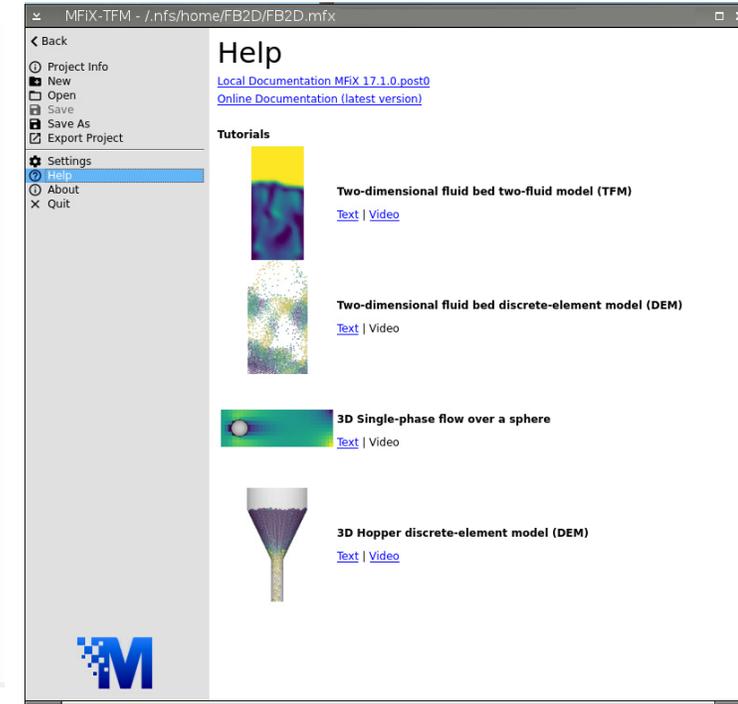
<https://mfix.netl.doe.gov/doc>

With video and text tutorials

Access documentation from GUI



The screenshot shows the MFiX website documentation page. The header includes the MFiX logo and version 17.1. A search bar is present. The main content area is titled "MFiX (Multiphase Flow with Interphase eXchanges)" and contains a description of the solver and a video player titled "MFiX 17.1 Overview". A sidebar on the left lists navigation options such as "About MFiX", "GETTING STARTED", "HOW TO", "REFERENCE", and "FOR DEVELOPERS".



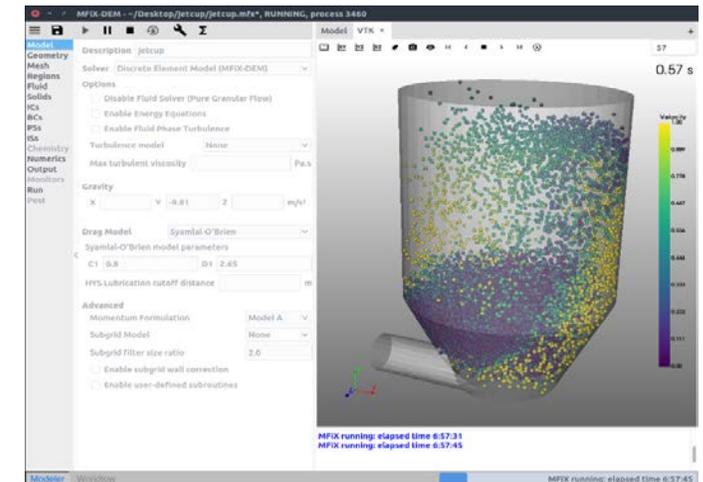
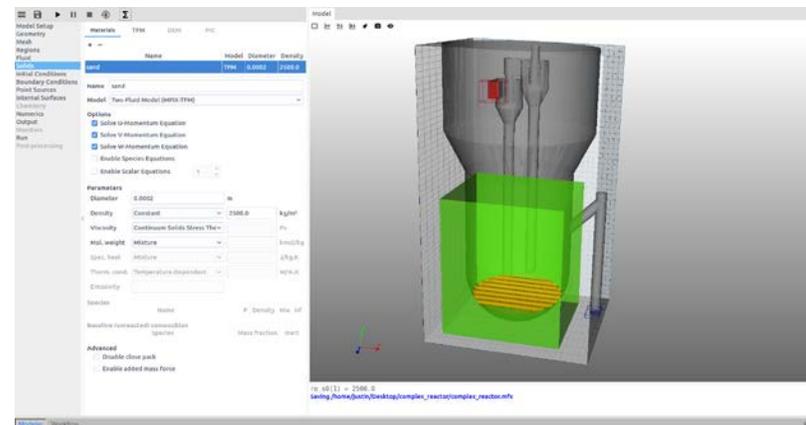
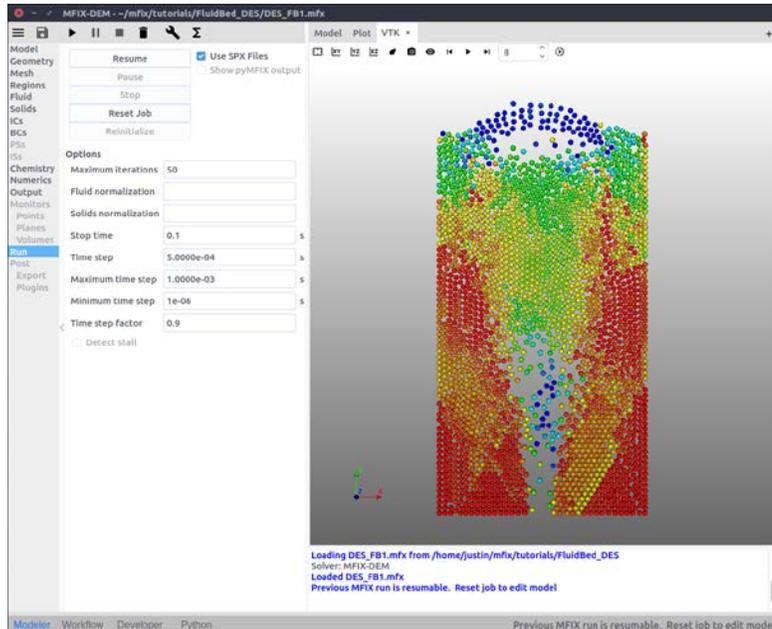
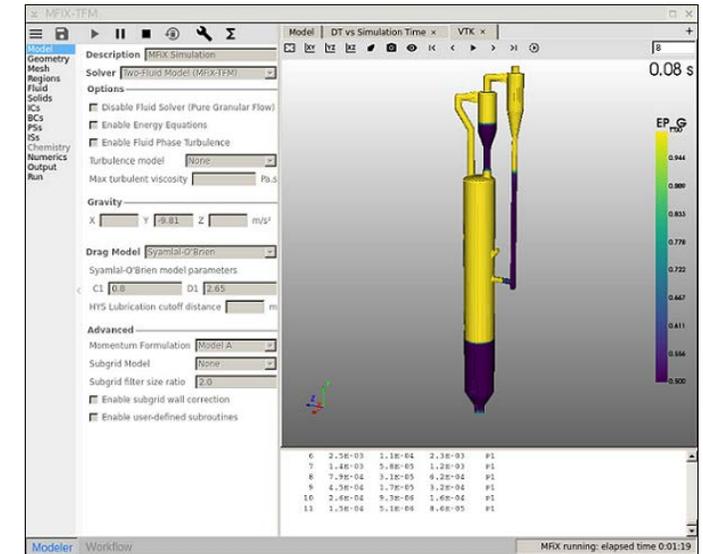
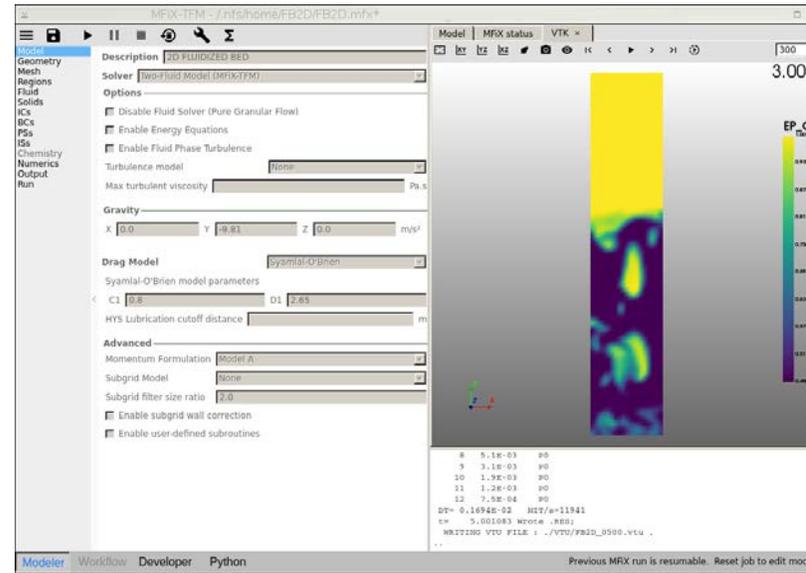
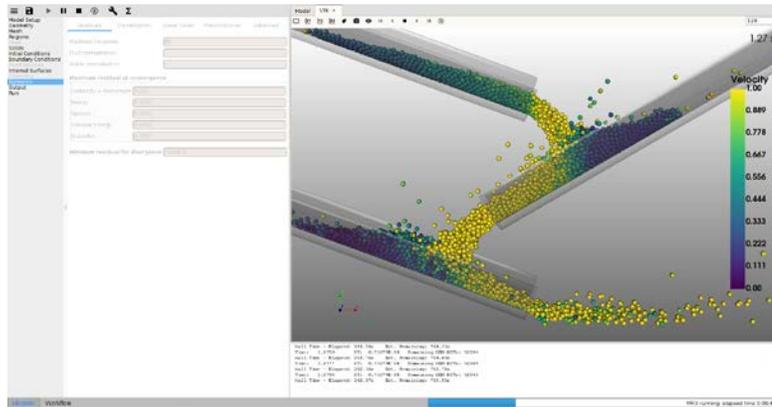
The screenshot shows the MFiX GUI help menu. The window title is "MFiX-TFM - /nfs/home/FB2D/FB2D.mfx". The menu includes options like "Project Info", "New", "Open", "Save", "Save As", "Export Project", "Settings", "Help", "About", and "Quit". The "Help" section is expanded, showing links to "Local Documentation MFiX 17.1.0.post0" and "Online Documentation (latest version)". Below this, there are four tutorial entries with corresponding images: "Two-dimensional fluid bed two-fluid model (TFM)", "Two-dimensional fluid bed discrete-element model (DEM)", "3D Single-phase flow over a sphere", and "3D Hopper discrete-element model (DEM)".

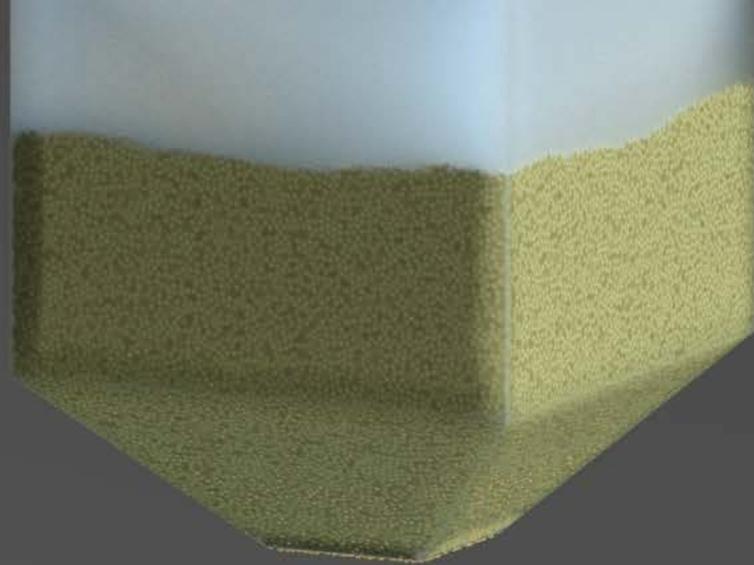
Future development (tentative):

- 17.2 Release (October 2017):
 - Workflow integration
 - Monitors
 - Point sprites (VTK \geq 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](mailto:mfix-help@mfix.netl.doe.gov)

MFiX 17.1 gallery





Happy Modeling
with **MFIX** 17.1!

