

PSRI's 3-ft (0.9-m)
ID x 20-ft (6-m)
Tall Bubbling
Fluidized Bed

NETL's 12-in
(0.3-m) ID x 52-ft
(15.9-m) Tall CFB

LEAVING THE DATA

After the challenge problem, the problem statements and resulting data will remain available. This will allow model developers to have a "tested" set of data for years to come. We realize that our limitations are not the creativity of our model developers but the availability of data they need.

CHALLENGE PROBLEM DOWNLOAD SITE

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

Key Contacts

Larry Shadle
Ray Cocco

lawrence.shadle@netl.doe.gov
ray.cocco@psrichicago.com

NATIONAL ENERGY TECHNOLOGY
LABORATORY
U.S. Department of Energy
P.O. Box 880, MS: N05
Morgantown, WV 26507
T: 304 285 4647 F: 304 285 0903
www.netl.doe.gov

PARTICULATE SOLIDS RESEARCH, INC.
4201 West 36th Street, Suite 200
Chicago, IL 60632
T: 773 523 7227 F: 773 299 1007
www.psrichicago.com

FLUIDIZATION MODELING CHALLENGE



PSRI
Particulate Solid Research, Inc.



MEASURING OUR
SUCCESS,
TARGETING OUR
CHALLENGES

3RD MODELING CHALLENGE IN
GRANULAR FLUID HYDRODYNAMICS

A SYSTEMATIC APPROACH TO MODELING

Gas and particle properties will be provided including the entire particle size distribution. In addition, minimum fluidization and bubbling curves with bed density profiles will be available including a CAD of the unit in which these measurements were collected. Modelers will be able to validate against the known design and operating conditions with the results from a simple system before modeling the challenge problems. Thus, modelers will be able to “test” and “tune” their models on a known system before attempting to model the challenge problems.

Validate against U_{mf} , U_{mb} and Bed Density Data

Model Challenge Problems

Compare Against Results

Refine Models

After submission of the first modeling results for the challenge problems, modelers can refine their model against the data available on November 1, 2010. Modelers will then be allowed to submit their refined model results.

Both the results from the initial and refined models will be published with explanations for any discrepancies. No additional entries will be considered after the release of the data on November 1, 2010. All submissions must be presented by

October 30, 2010, before the release of the data. It is up to the modelers if they wish to submit a refined model after the data has been released.

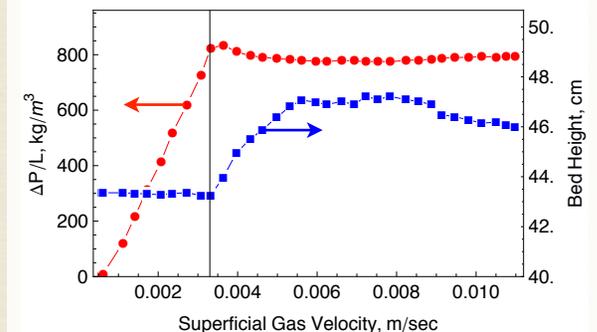
OVERVIEW

NETL, in collaboration with PSRI, has generated a third Challenge Problem from data generated in NETL’s circulating fluidized bed and PSRI’s bubbling fluid bed. The results are to be presented at the Circulating Fluid Bed X to be held in Sun River Valley, Oregon, USA in May, 2011 (www.cfb10.org). You are hereby invited to predict the data with your hydrodynamic model. The third challenge problem will be designed to overcome the limitations of the first two challenge problems. Physical properties will include minimum fluidization and bubbling velocities and bed densities. The first step in model validation should include capturing the minimum fluidization and bubbling velocities and bed densities. Modelers will be asked to submit modeling results based on the experimental description alone. After which, the data will be released and the modelers will have a second chance to provide modeling results. Both sets of results will be presented at CFB X. A description of the experimental unit used to obtain the hydrodynamic data, material parameters, and test conditions/parameters can be found at <https://mfix.netl.doe.gov>.

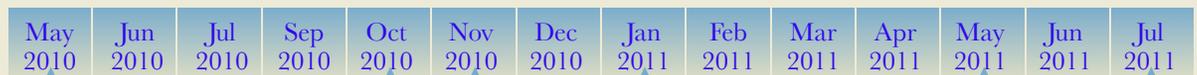
HAVING ALL THE INFORMATION YOU NEED

It is up to the modelers that appropriate boundary conditions are used. Detailed CADs will be provided of all the units for the challenge problems including aeration ports, solid feeds, valves, bends and injectors. Additional information on the unit configurations will be available on request, if it is not already provided. The objective of this challenge problem is to provide the modeler with the information they need to make assumptions based on engineering judgement and not on limited design and operating parameters. Poor validation should not be due to poor boundary conditions.

Min Fluidization Curve for FCC Powder Used in Fluidized Bed Challenge Problem



Timeline



May 9, 2010: Problem Descriptions Available at <https://mfix.netl.doe.gov>

Oct 30, 2010: First Simulation Results Due

Nov 1, 2010: Experimental Data Released

Jan 1, 2011: Second Simulations Results Due, if Needed

May 2, 2011: Workshop on Results at CFB 10

Jul 30, 2011: Publication of Results