NETL Multiphase Flow Simulation Challenge Problem: Small Scale Problem I

the ENERGY lab

NATIONAL ENERGY TECHNOLOGY LABORATORY

Further information on the Challenge Problem is available at www.mfix.netl.doe.gov/challenge. At the conclusion of the challenge problem, a dedicated website will host NETL's experimental data.

All participants and their submissions to the challenge problem will remain anonymous in NETL's publications. However, the individual submitters can opt for open publications on their own.

If you are interested in participating in this challenge problem or have any questions, please contact us at challenge@mfix.netl.doe.gov. All communications will be confidential.

U.S. Department of Energy

National Energy Technology Laboratory

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
T: 304-285-4764
www.netl.doe.gov

Scientific Advisory Committee

Madhava Syamlal, NETL
Ray Cocco, PSRI Chicago
Danesh K. Tafti, Virginia Tech.
John R. Grace, University of British Columbia
Jennifer Sinclair Curtis, University of Florida

PSRI Particulate Solid Research, Inc.

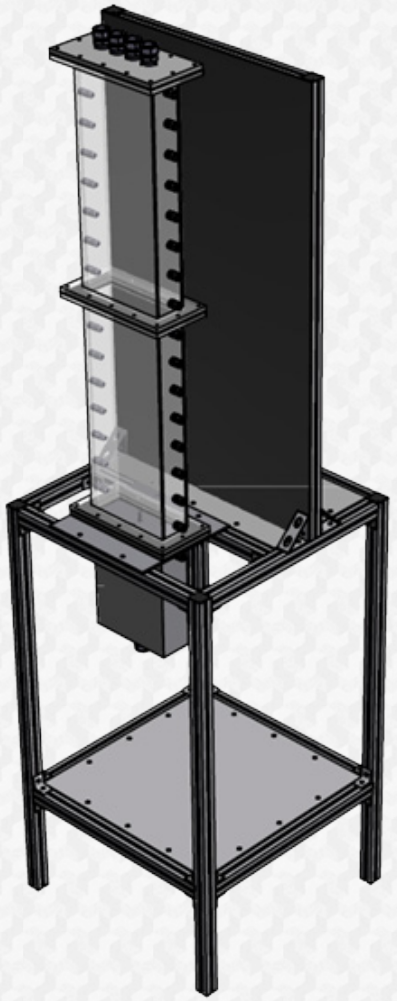
UBC

VirginiaTech Invent the Future

UF UNIVERSITY of FLORIDA

U.S. DEPARTMENT OF ENERGY

NETL



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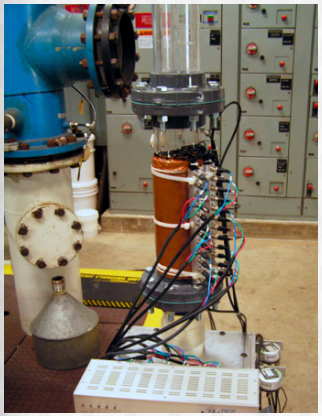
Invitation to Participate in NETL's Multiphase Flow Simulation Challenge Problem: Small Scale Problem I



Measuring solids concentration with electro capacitance volume tomography.

Background

At the 8th International Conference on Fluidization in 1995 at Toulouse, France, the first "Challenge Problem Workshop" was organized as suggested by Prof. John Chen. Fluidization Challenge problems were proposed again in 2001 and 2011. The objective of the present challenge problem is to help the systematic validation and uncertainty quantification of computational fluid dynamic models of multiphase flows.

What are the parameters of the Small Scale Challenge Problem I?

The Department of Energy's (DOE) National Energy Technology Laboratory (NETL), in collaboration with a scientific advisory committee, will release a multiphase flow simulation Small Scale Challenge Problem (SSCP-I) in January 2013 based on experimental measurements in two small scale bubbling fluidized beds: a 3"x9"x48" rectangular bed and a 4"x68" cylindrical bed. The purpose of SSCP-I is to improve the reliability of computational modeling of multiphase flows by validating with accurate and well defined experimental data.

The bed material for the experiment will be Geldart group D particles of uniform size and high sphericity. The number of particles will be kept between 10,000–250,000 to ensure that two fluid models, MP-PIC, and DEM simulations can be performed. Detailed information on the facility, flow conditions, and particle properties will be provided. Any missing input conditions noted by the participants will be updated.

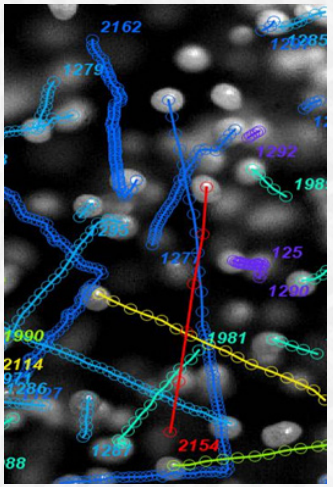
NETL will use state-of-the-art experimental techniques, including high speed particle image velocimetry (HsPIV), electro capacitance volume tomography (ECVT), and high speed pressure transducers for data acquisition. Measured Lagrangian and Eulerian particle velocity data, solids fraction, and slugging frequency with well defined error bars will be available to participants for comparison with their simulations.

Why should you participate?

The challenge problem will enable the research community to compare multiphase models with a common set of validation data. The knowledge gained will help accelerate the development of accurate computational models of multiphase flows.

Participants will be able to—

- Help in defining the challenge problem
- Receive data with quantified uncertainties from a well defined experimental problem, collected using accurate, state-of-the-art measurement techniques
- Compare their models with those of the other participants
- Learn from the post-challenge analysis and discussion of the results



Tracking of individual particles using high speed particle image velocimetry.

How do you participate?

First, email your interest in participation to challenge@mfix.netl.doe.gov to receive updates on the Challenge Problem. The Problem will be posted online by January 2013. Data submissions will be accepted until April 2013 when the experimental results will be released.