

Abstract

This training course will demonstrate a cutting-edge versatile software - Particle Dynamics Parallel Simulator (PDPS) - to predict and visualize the particle mixing process, which has been sponsored by AFOSR STTR: Particulate Composite Mixing Processes. The outcomes from Phase II will result in an enhanced and validated software package for a more heterogeneous system with various particle types under realistic mixing scenarios. Homogeneity index has been used to quantify the mixing levels. Particle dynamics is simulated by the discrete element method and smoothed particle hydrodynamics. The similarity of mixing process across different scales of particle systems is investigated for simulating large particle systems.

This software can produce significant benefits and broad commercial applications in the DoD labs, food, pharmaceutical, catalysis, mineral and other related industries as well as mixer manufacturers. It may provide customers with the key functionality and performance to realize maximum productivity benefits, from material engineering simulation to product design, from mixer performance demonstration to geometry optimization, and from nano-scale to macro-scale composite production. Future R&D of PDPS will be discussed and solicited in cooperation with DOD and industries.

Course Outline

Friday, September 14, 2018
Doolittle Institute, Shangri-La Auditorium,
1140 E. John Sims Parkway, Suite 1,
Niceville, FL 32578

Agenda

8:00 – 8:45 AM	Continental Breakfast
8:45 – 9:00 AM	Welcome Remarks (PO Dr. Schmidt & PI Dr. Yin)
9:00 – 9:30 AM	Overview of PDPS
9:30 – 10:00 AM	Introduction-algorithms
10:00 – 10:30 AM	Validation-experiments
10:30 – 10:45 AM	Coffee break
10:45 – 11:30 AM	Case studies
11:30 – 12:00 PM	Tutorial & practice
12:00 – 12:15 PM	Challenges & plan
12:15 PM & after	Open discussion

Acknowledgement

The R&D team is grateful to the support and inputs of AFOSR and AFRL colleagues:

Dr. Jennifer Jordan; Dr. Martin Schmidt; Dr. Steven Pemberton; Dr. Jonathan Spowart; and Dr. Douglas Nance.

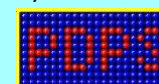
We also thank our industry collaborators:
Mr. Ken Langhorn from ROSS Mixers, and;
Mr. Jason Hayday from JAYGO, INC. for the accommodation of some experiments. In addition, we appreciate the constructive comments and advice of ARL colleagues:
Dr. Betsy Rice; Dr. Nirupam Trivedi; and Dr. Joshua Sadler.



Training Course

Underpin Particle Mixing Processes

with the Particle Dynamics Parallel Simulator



Post-Meeting Workshop
2018 Annual Review Meeting of the AFOSR
Dynamic Materials & Interactions Program

STTR- F14A-T22-0210: Particulate Composite Mixing Processes

Goal: Quantitatively understand the particle mixing process by using novel numerical algorithms and experimental studies.

Program Officer–Dr. Martin Schmidt

Air Force Office of Scientific Research
703-588-8436
martin.schmidt@us.af.mil

Business Contact–Dr. Jim Lua

Global Engineering & Materials, Inc.
(609) 356-5115
jlua@gem-innovation.com

Principal Investigator–Dr. Huiming Yin

Columbia University
(212)851-1648
yin@civil.columbia.edu

