IOWA STATE UNIVERSITY

CoMFRE Multiphase Flow Research

OpenQBMM – www.openqbmm.org

A NEXT-GENERATION OPEN-SOURCE COMPUTATIONAL FLUID DYNAMIC CODE FOR POLYDISPERSE MULTIPHASE FLOWS IN SCIENCE AND ENGINEERING

A. Passalacqua[1,2], R. O. Fox[2], Simanta Mitra[3]

[1]Department of Mechanical Engineering, Iowa State University

[2]Department of Chemical and Biological Engineering, Iowa State University

[3]Department of Computer Science

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OpenQBMM – www.opeqbmm.org

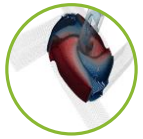
What is OpenQBMM?

A suite of libraries and solvers for OpenFOAM® to implement quadrature-based moment methods.

Features

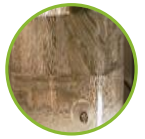
- Robust
  - Automatic enforcement of moment realizability
  - Moment-preserving advection schemes
  - Realizable integration of stiff source terms
- Validated
  - Test-case provided for each core component
  - Validation cases provided as example application for solvers

What problems can it solve?



Nanoparticle formation

(St << 1)



Gas-liquid systems with coalescence and breakup

St = O(1)

Polydisperse particulate systems (dense and dilute flows)

St >> 1

Full range of Stokes numbers

Broader impact and community

- 3 research groups at other institutions actively collaborate
  - University of Sherbrooke, Canada; Ecole Centrale Paris, France; University of Warwick, UK; Politecnico di Torino, Italy
- 6 external contributors
- Five graduate students supported (4 Ph.D., 1 M.Sc)
- 2 published journal articles (+ 2 in preparation)
- 24 invited talks
- Two training courses
- 3065 code builds (21 countries, non-unique IPs, ISU developers excluded)