Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

V-ONSET: Introducing turbulent multiphase flow facility focusing on Lagrangian interfacial transfer dynamics[1] ASHWANTH SALIBINDLA, ASHIK ULLAH MOHAMMAD MASUK, RUI NI, Penn State University — We have designed and constructed a new vertical water tunnel, V-ONSET, to investigate interfacial mass, momentum and energy transfer between two phases in a Lagrangian frame. This system features an independent control of mean flow and turbulence level. The mean flow opposes the rising/falling velocity of the second phase, "suspending" the particles and increasing tracking time in the view area. Strong turbulence is generated by shooting 88 digitally-controlled water jets into the test section. The second phase, either bubbles or oil droplets, can be introduced into the test section through a capillary island. In addition to this flow control system, V-ONSET comes with a 3D two-phase visualization system, consisting of high-speed cameras, two-colored LED system, and in-house Lagrangian particle tracking algorithm. This enables us to acquire the Lagrangian evolution of both phases and the interfacial transfer dynamics in between, paving the way for new closure models for two-phase simulations.

[1]Financial support for this project was provided by National Science Foundation under grant number: 1653389 and 1705246.

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Date submitted: 31 Jul 2017 Electronic form version 1.4