Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Eulerian large-eddy simulation of deep-sea hydrocarbon plume with multi-component gas bubble dissolution.[1] CHEN PENG, University of Houston, MARCELO CHAMECKI, University of California, Los Angeles, CHARLES MENEVEAU, Johns Hopkins University, DI YANG, University of Houston — The multiphase hydrocarbon plume released from a deep-sea oil spill usually contains a large amount of natural gas bubbles that provide the buoyancy force to raise the plume. The natural gas consists of various alkane compounds that can experience considerable dissolution in seawater in the deep-sea environment. This gas dissolution effect causes the reduction of the total buoyancy force as the plume rises, strongly affecting the structure and dynamics of the hydrocarbon plume in the region near the release source. In this study, a fast Eulerian large-eddy simulation (LES) model is developed to model the effects of multi-component gas bubble dissolution on the dynamics of the plume. The LES model is applied to simulate a subsea blowout from a depth of 700 meters, with an initial gas compound ratio of methane/ethane/propane = 87.5/8.1/4.4. Both instantaneous flow field and statistical characteristics of the plumes will be presented in this talk.

[1]This research was made possible by a grant from the Gulf of Mexico Research Initiative.

Di Yang
University of Houston

Date submitted: 31 Jul 2019 Electronic form version 1.4