Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Faraday instability in two-fluid mechanically forced rectangular and annular geometries[1] KEVIN WARD, Univ. of Florida, Dept. of Chemical Engineering, Gainesville, FL, USA, FARZAM ZOUESHTIAGH, Univ. of Lille 1, IEMN CNRS 8520, Lille, France, RANGA NARAYANAN, Univ. of Florida, Dept. of Chemical Engineering, Gainesville, FL, USA — In this work, we theoretically and experimentally investigate Faraday instability in immiscible two-fluid rectangular and annular systems. Within the examined frequency regime, the selected modes are discretized and experiments for comparison to theory are possible. A stress-free sidewall condition is adopted in the theoretical model, and is realized experimentally through careful selection of the testing fluids. Rectangular geometries offer ease of visualization and testing cell fabrication when compared to cylindrical geometries, but can give rise to discrepancies between ideal theory and experiments due to corner effects and wall damping. Theoretical and experimental results for a large square geometry are first presented to highlight the discrepancies due to corner effects. Next, multiple high aspect ratio rectangular geometries, where corner effects should be suppressed, are shown. Annular geometries of comparable dimension to these rectangular geometries are also presented to confirm the absence of corner effects. Agreement between the theoretical and experimental modes for a given frequency are obtained for all geometries. However, agreement between the predicted and observed threshold amplitude is shown to depend strongly on the cell size due to sidewall damping.

[1]Supported by NSF 0968313, CASIS NNH11CD70A, NSF DGE-1315138, and a Chateaubriand Fellowship.

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Date submitted: 28 Jul 2016 Electronic form version 1.4