Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Meniscus Stability in Rotating Systems[1] YVONNE REICHEL, MICHAEL DREYER, ZARM University of Bremen, Germany — In this study, the stability of free surfaces of fluid between two rotating coaxial, circular disks is examined. Radially mounted baffles are used to form menisci of equal size. To the center of the upper disk, a tube is connected in which a separate meniscus is formed. Assuming solid-body rotation and ignoring dynamic effects, it is observed that the free surfaces between the disks fail to remain stable once the rotation speed exceeds a critical value. In other words, Rayleigh-Taylor instability ensues when the capillary forces fail to balance centrifugal forces. Dimensionless critical rotation speeds are studied by means of the Surface Evolver via SE-FIT for varied number of baffles, the normalized distance between the disks, and the normalized central tube radius. Drop tower tests are performed to confirm some of the numerical results. The computation also reveals that there are different modes of instability as a function of the relevant parameters.

[1]This study was funded by the space agency of the German Aerospace Center with resources of the Federal Ministry of Economics and Technology on the basis of a resolution of the German Bundestag under grant number 50 RL 1320.

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Date submitted: 29 Jul 2013 Electronic form version 1.4