Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Thin cylindrical sheets of air SIGURDUR THORODDSEN, King Abdullah University of Science and Technology, DANIEL BEILHARZ, AXEL GUYON, Ecole Polytechnique, ER QIANG LI, MARIE-JEAN THORAVAL, King Abdullah University of Science and Technology — Drops impacting at low velocities onto a pool surface can stretch out thin hemispheric sheets of air. These air sheets can remain intact until they reach submicron thicknesses, whereby they rupture to form myriad of microbubbles. By impacting a higher-viscosity drop onto a lower-viscosity pool, we have explored new geometries of such air films. In this way we are able to maintain stable air-layers which can wrap around the entire drop to form anti-bubbles, i.e. spherical air layers bounded by inner and outer liquid masses. Furthermore, for the most viscous drops they enter the pool trailing a viscous thread from the pinch-off from the nozzle. The air sheet can also wrap around these treads and remain stable over extended time to form a cylindrical air sheet. We study the parameter regime where these structures appear and their subsequent breakup. The stability of these air cylinders is inconsistent with inviscid stability theory, suggesting stabilization by lubrication forces within the submicron air layer.

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Date submitted: 27 Jul 2014 Electronic form version 1.4