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Breakup of bubbles driven by vortex ring collision YINGHE QI, CARL URBANIK, NOAH CORBITT, ASHWANTH SALIBINDLA, RUI NI, Department of Mechanical Engineering, Johns Hopkins University — We present an experimental investigation of bubble breakup at the moment when two vortex rings collide with each other head on at high Reynolds numbers. At this moment, as the vortex cores break into finer scales, bubbles will experience strong fluctuations of local shear and pressure at multiple length scales, reproducing a flow environment that bubbles tend to experience in fully-developed turbulence. In this study, we use the piston-cylinder arrangement to produce and control the vortex ring collision, and the timing of bubble injection is adjusted to vary the distance between bubbles and the location where two vortex cores touch each other. Four high-speed cameras are used to simultaneously measure both the bubble breakup process as well as the surrounding flow. This study will help us to explore the idea of bubble-eddy collision that has been widely used in describing bubble deformation and breakup in fully-developed turbulence.

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