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Vortex formation in oblique shock interaction with a heavy gas column[1] PATRICK WAYNE, DELL OLMSTEAD, C. RANDALL TRUMAN, PETER VOROBIEFF, The University of New Mexico, SANJAY KUMAR, University of Texas - Brownsville — In an oblique shockwave interaction with a column of heavy gas, we observe both the expected counter-rotating vortex pairs (same as caused by normal shockwaves) and periodic co-rotating vortices that vary with Mach number. We study the effects of oblique shock interaction with a column of acetone-infused sulfur-hexafluoride (SF_6) gas. Visualization of the shock-accelerated gas column is accomplished via Planar Laser-Induced Fluorescence (PLIF) imaging. The shock tube itself is inclined at a 30° angle, while the initial conditions (ICs) are introduced into the test section vertically. Because of the inclined angle, the normal shock propagates down the shock tube and impacts the ICs at a 30° down-angle, producing an oblique shock. Vertical plane PLIF images reveal vorticity deposition between the SF_6 column and the surrounding air leading to Kelvin-Helmholtz instability. The evolving vortices cascade down the entire vertical length of the gas column, and interact with the counter-rotating vortex structures along the column. The most interesting aspect of this discovery is that these small-scale instabilities exhibit periodic behavior and, according to preliminary data, this behavior is Mach number dependent.

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