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Ultrasonic extraction and trapping of a droplet from fluid-fluid interfaces. ROBERT LIRETTE, LIKUN ZHANG, JOEL MOBLEY, The University of Mississippi — Ultrasonic waves provide a powerful means to exert forces on fluid objects (droplets and fluid interfaces) for the development of non-contact manipulation techniques or acoustic tweezers. Under the proper conditions, a propagating sound beam illuminating the interface of two immiscible fluids can exert a pulling force to deforming it against the incident direction of the sound beam. The direction of this force depends on the relative sound speeds and densities of the two fluids. We demonstrate the extreme case where a properly designed ultrasonic beam is used to break the interface and extract a single droplet from an interface of water to CCl_4. Remarkably, the extracted droplet is automatically and firmly trapped in the sound field which acts as an acoustic tweezer. High speed video was taken to display the dynamics of the interface during the procedure when the interface was broken and the droplet is extracted. This work can stimulate the development of techniques for the production and manipulation of fluid droplets.

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