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Dynamics of bouncing droplets in annular cavities ZACHARY LOUIS LENTZ, Department of Mechanical Engineering, UC Berkeley, MIR ABBAS JALALI, Department of Astronomy, UC Berkeley, MOHAMMAD-REZA ALAM, Department of Mechanical Engineering, UC Berkeley — In a cylindrical bath of silicon oil, vertically excited by a frequency of 45 Hz, we trace the motion of bouncing droplets as they fill an annular region. We compute the mean tangential and radial velocity components of the droplets and show that the maximum tangential velocity is larger than the maximum radial velocity by one order of magnitude. Velocity dispersions have almost equal levels in the radial and tangential directions, and their mean values are 1/4 times smaller than the mean tangential velocity. These results show that bouncing droplets undergo random motions within annular cavities determined by the interference patterns of self-induced circumferential waves. We derive analytical relations between the velocity dispersion and the wavelength of surface waves, and calculate the mean tangential velocity of droplets using the random kicks that they experience at the boundaries of the cavity by inward and outward traveling waves.

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