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Characterization of drop impact based on internal flow quantification ROHAN DE, ASHISH KARN, JOHN NOONAN, BRETT ROSIEJKA, ROGER ARNDT, JIARONG HONG, University of Minnesota — The impact of drops on solid and liquid surfaces and the post-impact phenomena of drop spreading, recoil, shape oscillations etc. have been discussed in numerous previous studies based on the non-dimensional parameters defined with respect to impact velocity, drop size, surface characteristics and liquid properties. Previous studies have characterized the variation of the external features of the post-impact phenomenon and modelled it based on energy considerations including the drop's overall kinetic energy and potential energy upon deformation. However, the internal flows induced within a drop upon impact has not yet been quantified and thus, internal kinetic energy has largely been ignored. In this study, we have characterized the flow structures developed inside a drop upon impact through Particle Image Velocimetry (PIV). Our study has shown a substantial difference between the overall kinetic energy and the potential energy at maximum deformation, and this difference is observed to correlate well with the internal kinetic energy estimated from our PIV measurements. Further, distinct regimes of vorticity have been observed and a hypothesis has been proposed to explain the occurrence of such modes. Also, these modes are related to the post-impact drop morphology.

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