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Particles for flow visualization and velocimetry in liquid nitrogen ENRICO FONDA, Università di Trieste - University of Maryland, College Park, MATTHEW S. PAOLETTI, University of Maryland, College Park, KATEPALLI R. SREENIVASAN, New York University, DANIEL P. LATHROP, University of Maryland, College Park — Liquid nitrogen may be used to generate, in a facility of a given size, Reynolds numbers which are substantially larger than that in water because its kinematic viscosity is one fifth that of water at 25° C. We present a simple technique, previously used in liquid helium [1,2], to create solid tracers for visualization and velocimetry in turbulent liquid nitrogen. These tracers are created by injecting a gaseous mixture of room-temperature nitrogen and an additional gas (element or compound) into the flow. The latter is selected such that, when cooled below 77 K (nitrogen boiling point), it freezes into solid particles with the highest mismatch in the index of refraction and the lowest mismatch in density compared to the surrounding liquid nitrogen. We discuss the formation process of the particles, and characterize the effects of the dilution ratio and gas selection on their size, brightness and fidelity. Possibilities of using this technique for fluid dynamics experiments that require visualization of high Reynolds number flows are reviewed. [1] G. P. Bewley, D. P. Lathrop, and K. R. Sreenivasan, Nature 441, 588 (2006). [2] M. S. Paoletti, R. B. Fiorito, K. R. Sreenivasan, and D. P. Lathrop, J. Phys. Soc. Jpn. 77, 111007 (2008).

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