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Hot balls splash and sink fast JEREMY MARSTON, King Abdullah University of Science and Technology, IVAN VAKARELSKI, SIGURDUR THORODDSEN, KAUST, DEREK CHAN, University of Melbourne — When a heated sphere is immersed in a liquid, we induce an inverted Leidenfrost effect whereby the sphere is wrapped in a vapour jacket which protects it from physical contact with the liquid and, when released to fall freely in the liquid, the sphere's terminal velocity can increase dramatically compared to a cold ball. This Leidenfrost-induced vapour layer can lead to significant drag reduction by up to 85% which appears to be the limiting case for drag reduction techniques based on gas layer injection. In a related experiment, when the heated sphere is released from above the surface, the dynamics of the entry are significantly different from the cold case, resulting in a prompt splash and cavity formation. We propose that this experiment is the ultimate non-wetting scenario during water-entry problems.

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