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Levitation, Herringbones and Propulsion HELENE DE MALEPRADE, DAN SOTO, CHRISTOPHE CLANET, DAVID QUERE, PMMH, ESPCI / LadHyX, Ecole Polytechnique — Controlling objects motion without contact is a major application issue as it ensures high mobility, low friction and no contamination. Levitation can be induced by blowing air from below through a porous medium, to create a thin air cushion under the object. The airflow is isotropic but if some asymmetry is introduced to rectify it, the levitating object can be controlled and propelled [1]. In our experiments, microscopic textures are engraved on the top of the porous medium, which directs the airflow. The resulting viscous entrainment enables drops, rigid plastic or even glass cards to self-propel [2]. If the micro-textures are displayed on the propelled object, the direction of the motion is reversed, which is found to result from a different mechanism of entrainment.

[1] Linke, H. et al, Self-Propelled Leidenfrost Droplets, Phys. Rev. Lett. 96, 2006
[2] Soto, D. and Lagubeau, G. and Clanet, C. and Quere, D. Surfing on a Herringbone, in prep., 2014

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