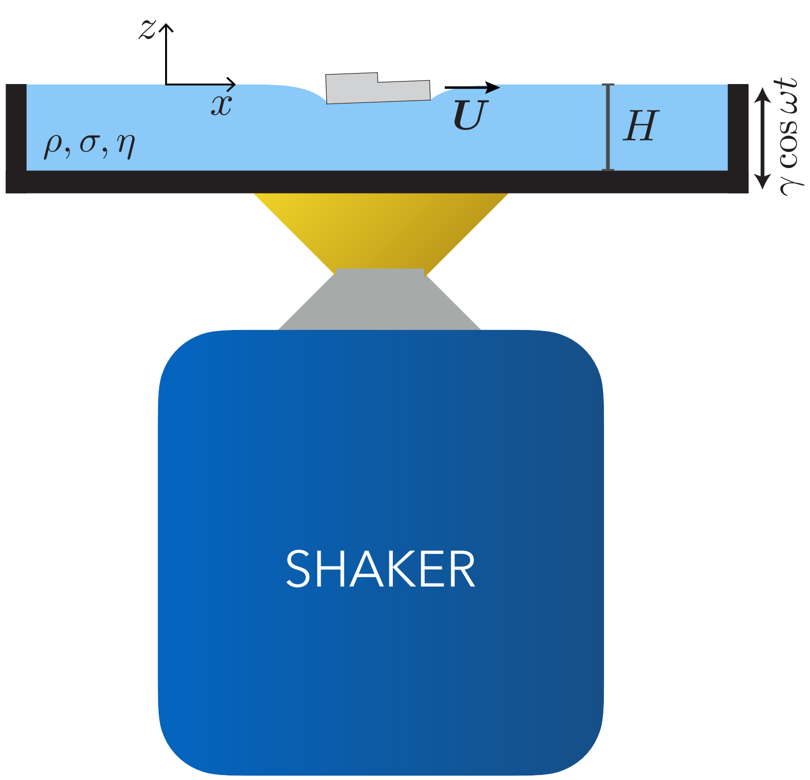
# Wave field of capillary surfers

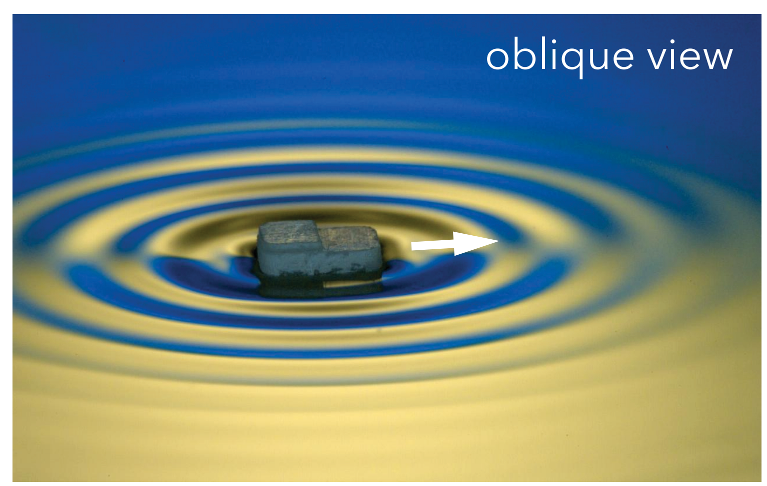
**Wilson Reino**[1,2], Antonin Eddi[3] , Riccardo C. Barberi[1,2] , Giuseppe Pucci[2]

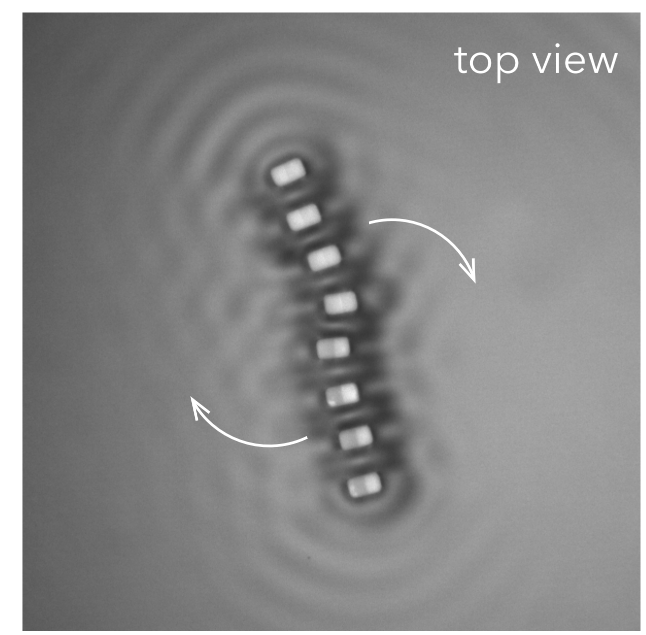
[1]Dipartimento di Fisica, Università della Calabria, Via P. Bucci, Cubo 31C, 87036 Rende (CS), Italia.
[2]Consiglio Nazionale delle Ricerche - Istituto di Nanotecnologia (CNR-NANOTEC), Via P. Bucci 33C, 87036 Rende (CS), Italy.
[3]PMMH, CNRS, ESPCI Paris, Université PSL, Sorbonne Université, Université de Paris Cité, F-75005, Paris, France.
wilson.reino.c@gmail.com

schematic side view




$\rho$ density | $\sigma$ surface tension | $\eta$ viscosity




Ho, I., Pucci, G., Oza, A. & Harris, D. M. arXiv:2102.11694v3 (2023).

# Propulsion mechanism

Ho *et al.* suggested that the propulsion of capillary surfers is due to asymmetric wave generation on the liquid surface.

In this framework, waves of larger amplitude $A_+$ would be generated at the stern, where the effective mass is larger, while waves of smaller amplitude $A_-$ would be generated at the bow, resulting in asymmetric radiation stress.

We check this hypothesis by performing surface wave measurements and verify if the surfer experiences the following net propulsive force

$$F_p = \frac{3}{4}\sigma k^2 w(A_+^2 - A_-^2)$$

**Surface reconstruction technique**