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Surfing with capillary waves: a survival strategy for trapped bees[1]
CHRIS ROH, MORTEZA GHARIB, California Institute of Technology — Honeybees are able to propel themselves at the water surface. A rapid vibration (30-220 Hz) of wings at the air-water interface results in a locomotion speed of 3-4 cm/s. A mechanism for generating thrust required for achieving and maintaining such speed must be different from their mechanism of flight inasmuch as they are in a different fluid environment. In this study, we present the thrust generating mechanism of the honeybee at the air-water interface. A close observation of the wing's interaction with the water surface showed that the wing does not penetrate nor detach from the water surface. Moreover, the stroke speed of the wing exceeds the minimum capillary wave speed, which signifies that the wing constantly generates the capillary wave by pulling on the surface with its wetted underside. Observation of such interaction suggests that honeybee's locomotion at the water surface resembles surfing on the self-generated capillary wave. A further evidence of described mechanism is explored by constructing a similarly sized mechanical model.

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