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Leaping of a flexible loop on water HO-YOUNG KIM, EUN JIN YANG, MIN-HEE LEE, BONGSU SHIN, Seoul National University — Small aquatic arthropods, such as water striders and fishing spiders, are able to leap on water to a height several times their body length. We study a simple model using a floating flexible loop to provide fundamental understanding and mimicking principle of the leaping on water. Motion of a loop, initially bent into an ellipse from equilibrium circular shape using a thin thread, is visualized with a high speed camera upon cutting the thread with a laser. We find that the loop may merely oscillate while afloat, penetrate into the water, or soar into air depending on the hydrophobicity, the bending stiffness, the weight and the degree of initial deflection of the loop. We also construct a scaling law for the leaping height by balancing the initial elastic bending energy with the loop's translational and vibrational energy and a loss imparted to the water in the forms of interfacial, kinetic and viscous energy.

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