Water walking—the new mode of rock skipping

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Credit: Utah State University

Researchers at Utah State University's Splash Lab discovered a new mode of water surface skipping termed "water walking".

In collaboration with scientists at the Naval Undersea Warfare Center in Newport, R.I., and Brown University, Utah State University Assistant Professor of Mechanical Engineering Tadd Truscott and his associates at USU's Splash Lab have unraveled the physics of how elastic spheres "walk" on water. Their findings were recently published in the

prestigious research journal *Scientific Reports*.

This research not only reveals the physics of how elastic spheres interact with water, but it also lays the foundation for the future design of water-walking drones.

Truscott's team used high-speed cameras to record elastomeric spheres skipping over a tank of water. Water walking occurs when elastic spheres gain significant speed over the first several impacts, causing the sphere to maintain a deformed, oblong shape—like a stone one might find near the shore.

This behavior is characterized by the sphere moving nearly parallel to the water surface with the tip of the oblong shape dipping below the water surface with each rotation while the shorter sides pass just above, giving the impression that the sphere is walking across the water's surface.

"Although this has been a long study, the new modes we discovered make it easier for us to envision using the technology for practical uses like water-walking drones," Truscott said.

The team discovered there are two different types of water walking. The first type skips once every full rotation and the other skips twice every full rotation. This distinction can be controlled with an equation that can predict the number of skips that will occur.

Truscott said this research provides new insights to water impact physics—an important area of study in naval operations and maritime and ocean engineering.

More information: Randy C. Hurd et al, Water walking as a new

mode of free surface skipping, *Scientific Reports* (2019). DOI: 10.1038/s41598-019-42453-x

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