

Underwater minirobots actuated by hybrid driving method

Xinghong YE, Yang YANG, Pengcheng JIAO,
Zhiguo HE, Lingwei LI

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Design principle

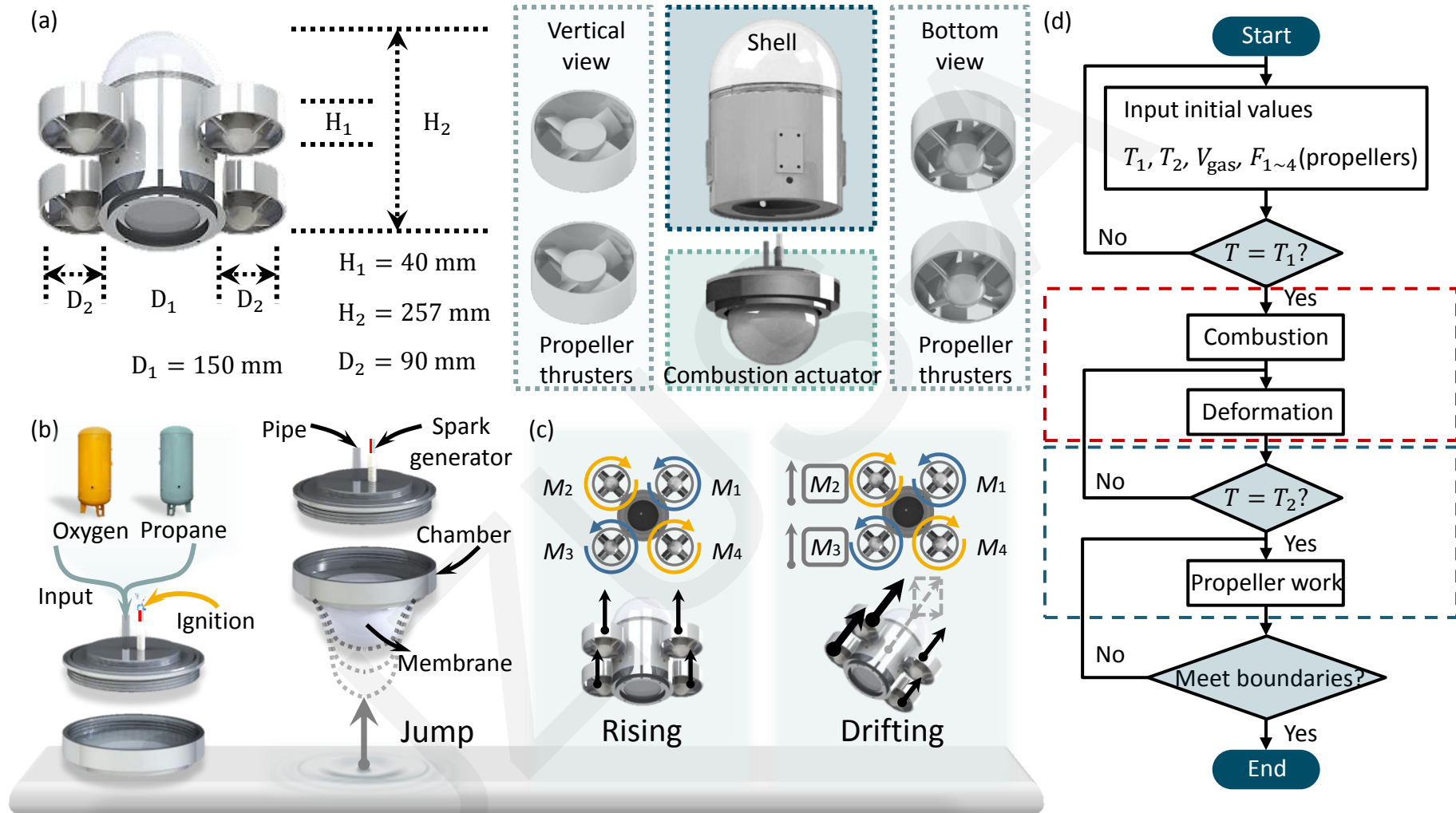


Fig. 1. Design principle and dimensions of the underwater minirobots actuated by HDM: (a) Overall design and dimensions of the minirobots, (b) structures and the actuation principle of the combustion actuator, (c) Propulsion principle of the propeller thrusters, and (d) flowchart illustrating the control principle of the robot actuated by HDM.

Motion mode

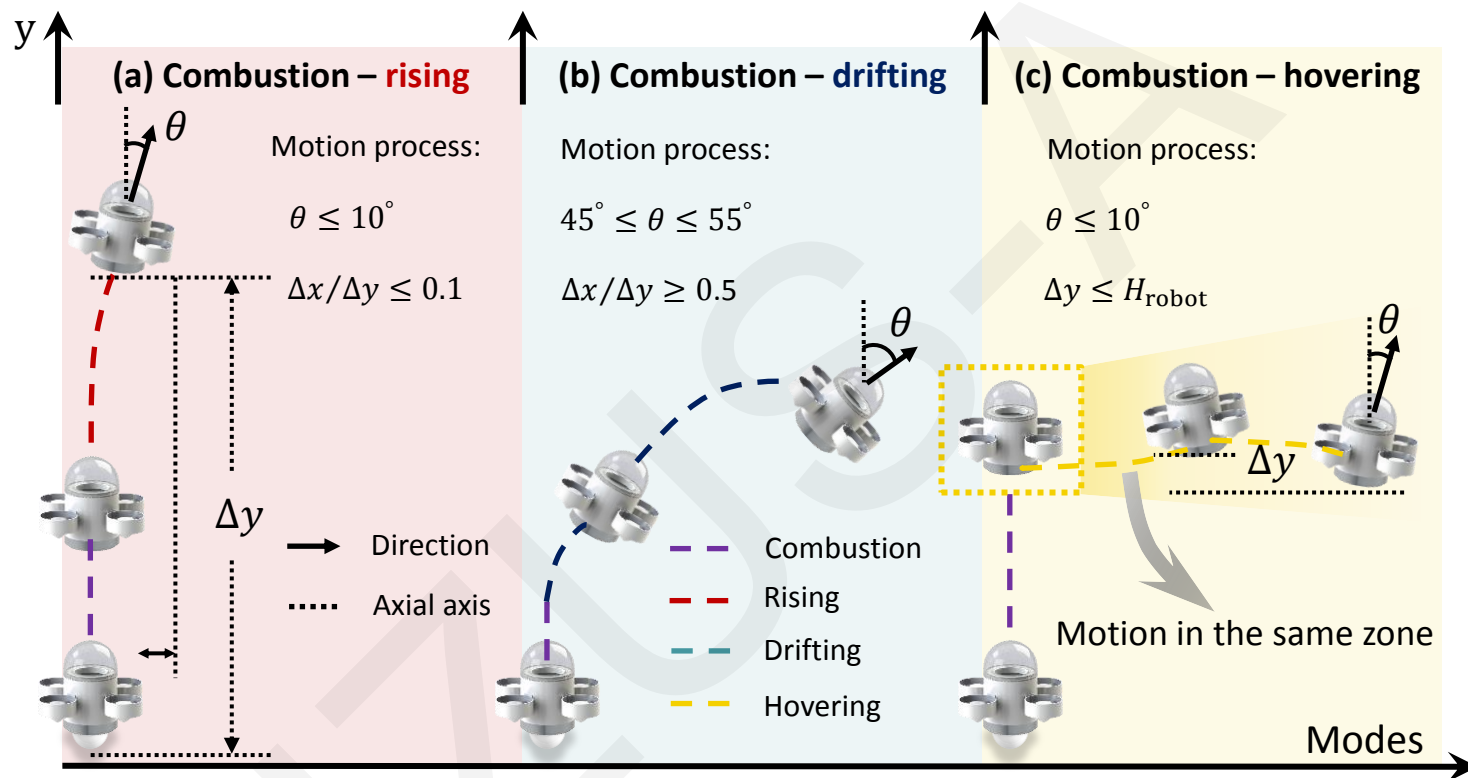


Fig. 2. Motion strategies and quantitative definitions of the three planned motional modes: (a) the rising mode, (b) the drifting mode, and (c) the hovering mode.

Motion performance

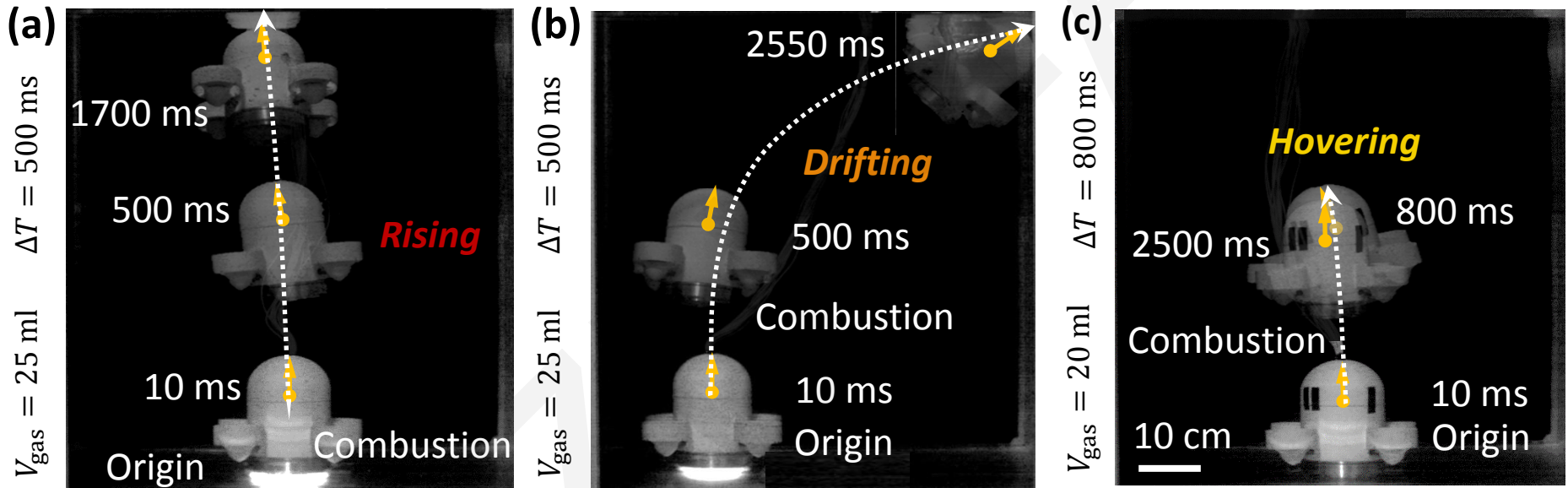


Fig. 3. Experimental results of the HDM microbots: (a) the combustion-rising mode, (b) the combustion-drifting mode, and (c) the combustion-hovering mode.

Potential application

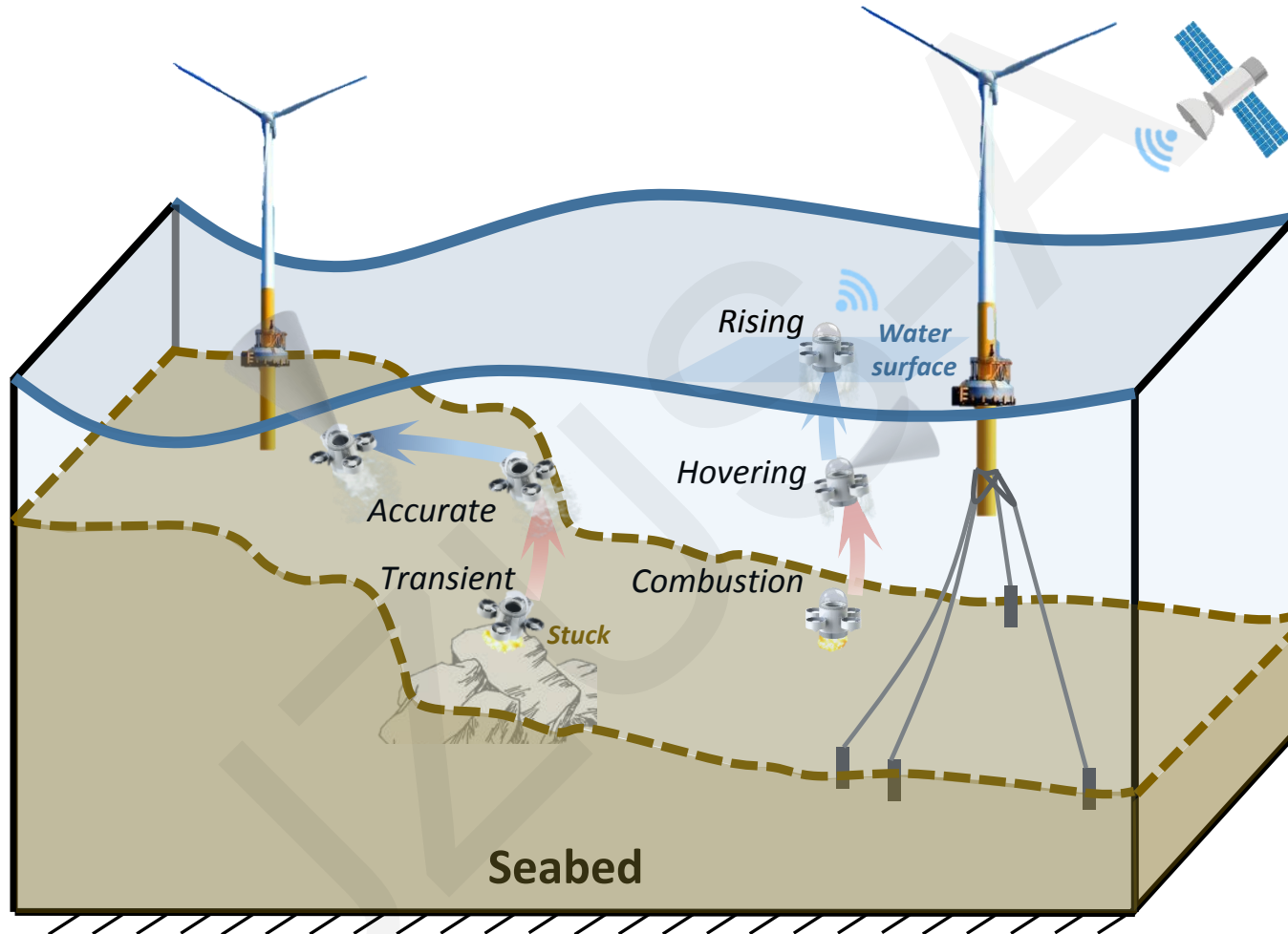


Fig. 4. Potential applications of underwater minirobots actuated by hybrid driving methods.

Conclusions

- The minirobots are able to transiently jump by combustion and then keep rising, steering or remaining stable at a certain location, which have good operation reliability and transient actuation ability.

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