Abstract Submitted
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Adaptive-passive control of flow over a sphere at high Reynolds numbers[1] SEOKBONG CHAE, JOOHA KIM, JAE HWA LEE, Ulsan National Institute of Science and Technology — Controlling flow over a bluff body by simple shape modification is the most common strategy of passive flow control. It has the advantage that no energy input is required, but has the limitation in that its flow-control effectiveness depends on Reynolds number (Re). That is, a fixed-sized surface modification that successfully controls flow in a certain Re range does not work for other Reynolds-number ranges. In the present study, a new passive control method (AMR: adaptive moving ring) is devised to reduce drag on a sphere with no Reynolds-number dependence at high Reynolds numbers of $0.4 \times 10^5 - 4.6 \times 10^5$, and tested through wind-tunnel experiments. AMR uses an elastic spring as both sensor and actuator, and adaptively changes its size depending on the wind speed (i.e. Reynolds number) without power input. We measure the drag on a sphere with AMR and compare it with that of a smooth sphere. The spring constant is manually tuned for optimal performance, showing up to 64% drag reduction in the tested Reynolds-number range. Some more details will be discussed in the presentation.

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Jooha Kim
Ulsan National Institute of Science and Technology

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