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Flow characteristics of a hovering quadrotor UAV in ground effect[1] SEUNGCHEOL LEE, JOOHA KIM, Mechanical engineering, UNIST — For a hovering quadrotor UAV near the ground, both the rotor interaction and ground effect play important roles in determining the flow characteristics of the UAV. To investigate the effect of the ground height and the distance between the rotors of the quadrotor UAV on the wake structure, we perform PIV measurements with varying the distance between rotors ($0.13 \leq d/R \leq 2.37$, where d is the distance between the adjacent rotor tips and R is the radius of the rotor) and the height of the UAV above the ground ($0.31 \leq h/R \leq 7.0$, where h is the distance between the rotor tip-path plane and the ground). When out of ground effect ($h/R \geq 5.0$), as d/R decreases, the rotor wake deflects more towards the center of UAV. On the other hand, when in ground effect ($h/R \leq 2.0$), at a large d/R, the weak recirculating flow is formed between the rotors. The recirculating flow becomes stronger with decreasing d/R, entering the vortex ring state. With further decreasing d/R, the strong fountain flow is generated between the rotors. Some more details will be discussed in the presentation.

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