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Flow transition in surface switching of rotating fluid YUJI TASAKA, KENTARO ITO, MAKOTO IIMA, Hokkaido University — This study aims to investigate the flow transition appearing in a process of "surface switching." In a flow driven by a rotating disk in a cylindrical open vessel, the free surface changes irregularly its shape from axisymmetric to nonaxisymmetric and v.v. while repeating its up-and-down motion of the center part of the free surface (so-called "surface switching" [Suzuki *et al.*, *Phys. Fluids*, **18** (2006), 101701(1-4)]). The instantaneous velocity profile of the flow along the radial direction was measured by ultrasonic velocity profiling, UVP, to investigate the flow transition quantitatively. It is revealed that the turbulent intensity shows a transition at the same Reynolds number as that for the surface switching. Also, the detailed analysis of the turbulent intensity and the power spectrum of velocity profile shows that the fluid-air interface becomes unstable at a smaller Reynolds number than the critical Reynolds number for the surface switching. By decreasing Reynolds number after the onset of the switching, a hysteresis phenomenon in the switching is observed; two different states stably exist at the same Reynolds number.

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