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Temporally irregular surface switching of rotating flow in a cylinder; influence of surface tension and aspect ratio YUJI TASAKA, The University of Manchester, MAKOTO IIMA, Hokkaido University — We have investigated experimentally the recent reported phenomena called "surface switching" that occur in the flow driven by a rotating disk in a cylindrical open vessel (Suzuki et al., 2006). It shows temporally irregular vertical motion of the surface with changing its shape between an axisymmetric shape and a non-axisymmetric shape. There are four control parameters to describe the phenomena; Reynolds number (Re), Froude number (Fr), Weber number (We) and aspect ratio (A) between the radius of the cylinder and the height of the fluid layer. In a restricted condition on the working fluid and aspect ratio (Water, $A = 0.95$), behaviors of the phenomena for Re and Fr were discussed. This issue reports influence of other uninvestigated parameter, We and A, by using some kind of working fluid (water, Silicone oil and liquid gallium) and by changing surface height. 10 cSt Silicone oil layer has an axisymmetric shape even at a small rotating speed, and corresponding velocity fluctuation shows larger value than that in water at the same rotating speed. But it has never showed the irregular surface switching after it attaches to the bottom in spite of large deformation of the surface. It would be insufficient on the Reynolds number due to its 10 times large viscosity of water.

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