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Influence of the surface tension and the viscosity on irregular surface switching of rotating fluids YUJI TASAKA, MAKOTO IIMA, Hokkaido University — We have investigated the influence of the surface tension and the viscosity of the fluids on temporally-irregular surface switching, which is a recently discovered phenomenon of rotating fluids accompanied by a free surface deformation (see Suzuki *et al.*, *Phys. Fluids*, 2006 and Tasaka & Iima, *J. Fluid Mech.*, 2009). Tap water, liquid Gallium, 1 cSt and 10 cSt Silicone oils were used to change the viscosity and the surface tension; oils have smaller surface tension than water and liquid gallium larger one than water. Variations of the magnitude of the velocity fluctuation with respect to the speed of the disk rotation were obtained for the fluids without liquid gallium as the bifurcation diagram. Comparison of the diagram between the fluids indicates that the smaller surface tension enhances the surface deformation but prevents the appearance of the surface switching. Surface motion recorded by a digital video camera shows that the surface of the rotating oil(1 cSt) has sloshing motion ($n = 1$) ahead of the surface switching instead of the intermittent deformation of the surface shape ($n = 2$) which was observed in water; here n means the mode of axisymmetry breaking on the free surface.

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