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Scenarios on a rotating two-fluid interface with a density contrast - the morphology and the transitions[1] WEI-TING LIN, CHING-YAU LAI, Dept. of Physics, Nat'l Taiwan University, CHI-CHUNG CHANG, Inst. of Physics, Academia Sinica, YIH-YUH CHEN, Dept. of Physics, Nat'l Taiwan University, JIH-CHIANG TSAI, Inst. of Physics, Academia Sinica, INST. OF PHYSICS, ACADEMIA SINICA COLLABORATION, DEPT. OF PHYSICS, NAT'L TAIWAN UNIVERSITY COLLABORATION — We study experimentally an oil-water interface maintained in a cylindrical container with its upper boundary rotating at constant speeds. The interface exhibits intriguing morphology as the rotation speeds up, making transitions from a smooth hump that presumably compensates the centrifugal-force induced pressure dip, to more fascinating geometries such as a spinning flap top (a plateau) or a mound with distinct spatial steps. The available scenarios can be controlled by varying the depths of two fluids as well. Increasing the rotation rates also tends to induce wavy patterns that break the axial symmetry of those base shapes, while a violent collapse of the oil-water interface occurs at sufficiently fast rotations. We attempt to give partial explanations for the different scenarios.

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