

Abstract Submitted  
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**Air flow structure over a sessile droplet: Wettability and size effects**<sup>1</sup> REZA YAGHOUBI EMAMI, York University, YEWON KIM, HYUNG-MIN PARK, Seoul National University, ALIDAD AMIRFAZLI, York University — A PIV study on the airflow over a sessile water droplet exposed to a shearing boundary layer flow was done in a wind tunnel. The free stream velocity,  $U_\infty$  was set just below the air velocity that causes the droplet to move. Re number based on  $U_\infty$  and the height of the droplet ( $h$ ) was  $500 \leq Re_h \leq 1500$ . We studied the effects of the substrate wettability (PMMA, PEMA, PS, and Teflon) and droplet size (10-30  $\mu$ l) on flow characteristics (flow structure, vorticity, etc.) in the plane that bisects the droplet streamwise. Common to all systems was formation of a strong eddy flow in the bisect-plane. The location of the eddy depended on the surface wettability, and to a certain degree droplet size. Droplet surface oscillations caused instabilities in the eddy observed in case of drops on a PMMA surface. Also, flow structure showed a bifurcation that was not seen when 2D objects were examined (this is due to intrusion of flow from sides into the wake area). We will also discuss the effect of surface oscillations by comparing results for flow around a sessile droplet and a rigid mockup of the droplet.

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