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Water-air dynamic contact angle hysteresis on rough metal substrates[1] MARINA MACHADO[2], JOSEPH MURPHY[3], WILLIAM RICE[4], VLADIMIR ALVARADO[5], University of Wyoming — Ice adhesion measurements for impact ice and statically frozen water are critical for solving important aerospace challenges, such as ice-resistant coatings. The surprisingly large spread of ice adhesion values obtained on seemingly very similar materials indicate that additional considerations, such as surface roughness and contact-line spreading, need to be incorporated into the analysis of ice adhesion. In this work, we focus on dynamic water-air contact angle on metal substrates of interest, such as stainless steel and aluminum, using a pendant-drop system over a frequency range 0-10 Hz. Surface roughness of metal substrates is measured using confocal microscope profilometry mapping. Dynamic contact angle hysteresis turns out to be a weak function of frequency in the range examined, but a strong function of the type, e.g., anisotropy and spatial correlation, and degree of surface roughness. These results might partially explain differences and large spread reported in the literature regarding impact ice adhesion.

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