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A new spin on wetting angle TADD T. TRUSCOTT, ALEXANDRA H. TECHET, MIT — Non-rotating, spherical projectiles impacting a water surface generate different cavity and splash behaviors depending on the static wetting angle. The wetting angle made between a liquid and a solid surface varies with surface coating and roughness, with large angles for hydrophobic coatings and small angles for hydrophilic coatings. It has been shown that for sufficiently low static wetting angles and low impact velocities it is possible to prevent cavity and splash formation all together. The wetting angle changes dynamically when a solid surface moves relative to the surrounding fluid. Unique, asymmetric effects can be found when transverse spin is imparted to the sphere before impact. The tangential velocity of the sphere's surface results in a different dynamic wetting angle on the two opposite sides of the sphere. On the side of the sphere which descends the fastest, relative to the fluid, the wetting angle is *increased* and on the opposite side, which has a slower relative velocity, the wetting angle is *decreased*. For sufficiently high spin rates, this asymmetry can result in splash only forming on one side of the object where the dynamic wetting angle is highest. A physical explanation of the mechanism behind the formation of a fluid wedge across the center of the cavity will also be presented, as related to the dynamic wetting angle discussion.

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