Abstract Submitted
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Spreading of Volatile Low-Viscosity Drops on a Solid Dry Surface[1] MATTHEW WALLACE, BENJAMIN AVILA, University of California, Irvine, SIGURDUR THORODDSEN, King Abdullah University of Science and Technology , PETER TABOREK, University of California, Irvine — We present the results of our investigation of the spreading of volatile low-viscosity drops (methanol, ethanol, and 2-propanol) spreading on a dry glass surface at room temperature under three atmospheric conditions: in ordinary air at 1 atm pressure, in an atmosphere of air mixed with each fluid's own saturated vapor at 1 atm, and along the coexistence curve in an atmosphere of each fluid's respective saturated vapor pressure. We observe that the spreading follows a power law, with the drop footprint radius r growing as a function of time t, with $r \sim t^a$. The growth law is highly dependent on the surrounding atmosphere. For large aspect ratio pancake drops of these fluids in air at 1 atm, the exponent $a \sim 1/4$, in contrast to nonvolatile viscous fluids whose exponent is typically 1/10 (Tanner's law) or 1/8, depending on the regime. If the surrounding atmosphere is saturated with the volatile fluid's vapor (with or without the presence of air) the growth exponents revert back to conventional values near 1/8. We present a model to explain this variation in spreading exponents.

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