

## **Theory for Undercompressive Shocks in Tears of Wine**

We consider the classical problem of ethanol-water mixtures in a social drinking situation. Evaporation leads to a depletion of alcohol at the meniscus resulting in a Marangoni stress that causes a film of liquid to rise up the side of the glass. This phenomenon has been documented scientifically since the 1800s and studied quantitatively over the past 30 years. However prior work did not analyze the most common occurrence of "wine tears" in a prewet glass. I show that prewet surfaces can lead to an unusual mathematical structure comprised of a reverse undercompressive shock and a rarefaction wave. Along with this analysis I will review the theory of undercompressive shocks in driven films. I will show new experimental data illustrating this effect and compare it to prior work on thermally driven films that also can exhibit such behavior. I will attempt a live demonstration over zoom.