



# Solving the Mystery of the Wine Legs

Many people (even before having a few glasses of wine) wonder what causes the “tears” or “legs” that form on the sides of the glass. Although legs are often thought to be an indicator of the quality of a wine, they actually form primarily because of the alcohol in the wine. Yet that’s not a complete explanation. Recently, mathematicians, relying on a theory built on differential equations, showed that the most dramatic legs arise when a combination of gravity, alcohol evaporation, and surface tension creates tiny shock waves in the wine on the glass. The waves generated from swirling the glass assist in the wine’s climb up the sides, and instabilities in the waves cause the legs to take shape.

The discovery of the effect of the unusual shock waves, called *reverse undercompressive shock waves*, has not only clarified what causes legs but also has opened up the opportunity for some creative applications. Glass shapes could be made that take advantage of geometry and optimize a wine’s ascent as well as its aroma. Furthermore, these findings could be applied to other thin films, which are crucial



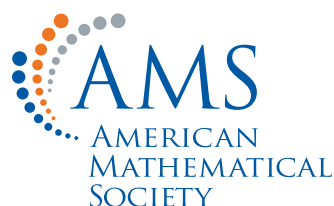
in the manufacture of many electronic components such as integrated circuits. A discovery useful for wine and silicon chips—a delightful pairing made possible by mathematics.

**For More Information:** “A theory for undercompressive shocks in tears of wine,” Yonatan Dukler, Hangjie Ji, Claudia Falcon, and Andrea L. Bertozzi, 2019.

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