

Baylor Undergraduate Lecture Series
in
Mathematics
Inaugural Lectures

Mathematics and Soap Films

Wednesday, November 5 • 3:30 p.m.

Kayser Auditorium, Hankamer School of Business

Why do one-celled creatures take the shapes they do? Why do red-blood cells have their characteristic shape? More and more, in biology as well as other sciences, the notion of “shape” is becoming important. Mathematicians have ways of measuring shape and of determining shape through optimization. This fits well with Nature’s penchant for economy, so it isn’t surprising (in retrospect) that soap films, which arise from surface tension’s ability to shrink surface area, are a kind of analog computer for the mathematics of minimizing surface area. This talk will consist of three parts: soap film demonstrations (which will set the stage for); a bit of mathematics and; computer experimentation and illustration. Since audience participation is required for soap film experiments, attendees are encouraged not to wear their best attire!

**Variational Principles and Real-World Shapes:
Balloons and Droplets in Space**

Thursday, November 6 • 3:30 p.m.

Sid Richardson Building, SR344

When we look at Nature, we see shapes everywhere. In this talk, we will describe the shape of a Mylar balloon in terms of a variational principle and see how this can be understood in terms of the physical characteristics of balloons. (A Mylar balloon is often found at kids’ birthday parties and is formed by taking two disks of Mylar, sewing them together along their boundaries and inflating.) This topic is a prime example of the interplay among physical principles, geometry, analysis and symbolic computation. We will also discuss the principles determining the shapes arising in water-bubble experiments aboard the International Space Station.

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