

Harnessing the Geometry of Soap Bubbles to Inspire Future Mathematicians

RESEARCHERS

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THE OVERVIEW

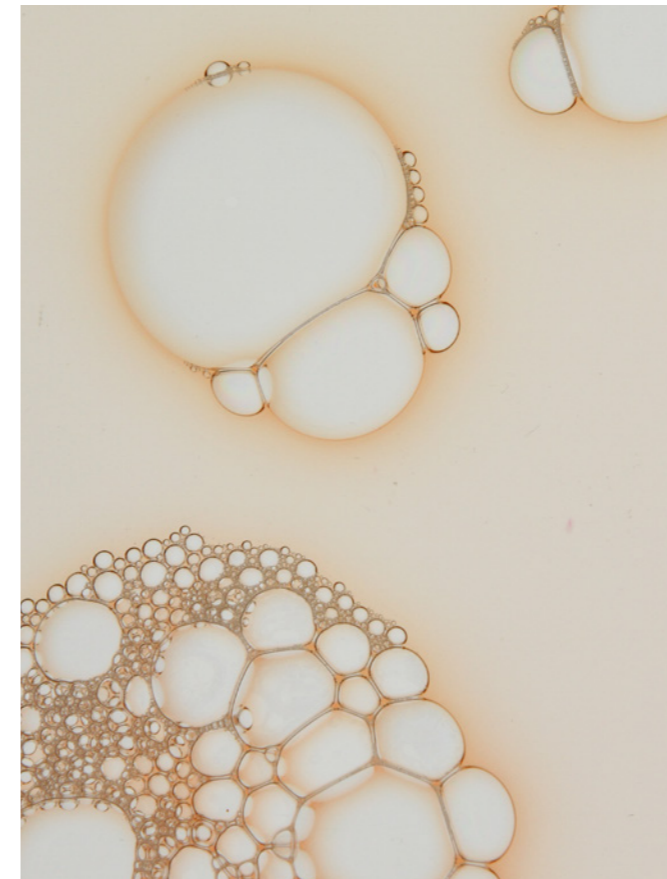
Aberystwyth University's (AU) research on the optimal arrangements of soap bubbles and soap films has been used as a vehicle for public engagement in Mathematics. Presentations and demonstrations have been given in both Welsh and English at various events, such as school visits and national festivals. These have had an impact on the awareness and interest of school children in geometry and Mathematics, and have also inspired teachers to consider different ways of teaching Mathematics. The activities have been used as part of AU's efforts to broaden access and to enhance participation with research in the mathematical sciences.



THE RESEARCH

AU researchers have developed a number of research-related talks and demonstrations on the geometry of soap bubbles, to explain the mathematics involved in finding minimal surfaces to secondary school students. The activities involve:

- Demonstrating Plateau's laws using wire frames, including hysteretic transitions between different local minima;
- Observing least area arrangements of soap films, comparing the solutions with intuition;
- A discussion of soap-film solutions of Steiner-like problems in the plane (for example, the shortest road network joining different towns/cities in Wales), and local minima in complicated energy landscapes, and the need to solve such problems numerically when there are additional constraints (for example, mountains).



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THE IMPACT

INSPIRING

Our outreach activity was presented to more than 200 secondary school learners during school visits across Wales and the Marches. Learners were inspired by the sessions, which had a positive impact on their interest in Mathematics. The availability of the activity through the medium of Welsh was particularly appreciated. The activity also inspired some of the teachers who participated, to think how to present other mathematical topics in a fun and interesting context and to be more aware of how Mathematics and research apply outside the classroom.

BRIDGING

Activities have also been presented at many Further Mathematics Support Programme Wales (FMSPW) conferences, and has enabled the FMSPW to offer enrichment sessions through the medium of Welsh. The activities were also adapted as 50-minute videos, in Welsh and in English, to be part of the FMSPW's Bridging A-level to University programme, which contributed to a large number of Welsh Year 13 students reconnecting with Mathematics during Covid-19 restrictions. Approximately 200 students from over 30 schools participated in the programme overall, with over 1,000 views of the videos in the series, which helped the students to continue learning about Mathematics during lockdown.

RESOURCE

As a result of Covid-19 restrictions, the outreach activity has been adapted into an online learning resource, which is available through portals set up by Aberystwyth University and the Coleg Cymraeg Cenedlaethol as well as indirectly through the Welsh Government's own resources Hub. The resource attracts 10-20 new users each month.

We have also taken the activity to the National Eisteddfod and the Urdd Eisteddfod, as part of a wider collaboration between the Urdd and Aberystwyth University, which has seen a growth in STEM activities at the festivals. The attraction of bubbles encourages children and their families to have a go at solving mathematical problems, raising the profile of Mathematics.