

Snow Sculpting

with

Mathematics

News Release

Jan 25, 1999

Noted mathematical sculptor Helaman Ferguson led his team to the successful construction of a 12-foot high Costa surface made of snow at the 9th annual Breckenridge (Colo.) Interational Snow Sculpture Championships. Ferguson's assistants were Macalester math professors Dan Schwalbe and Stan Wagon and Macalester student Tamas Nemeth.

A Costa surface is a new type of shape -- an example of a minimal surface -- discovered 15 years ago by the Brazilian mathematician C. Costa. He was inspired by the skirts and hats of the dancers at Rio's Carnival, and this theme is evident in the sweeping curves and shapes of the surface. From both artistic and mathematical standpoints the surface is noteworthy. The sculpture's title is "Invisible Handhsake", which refers to the fact that it represents the space between two hands that come together but do not touch. Every point of the surface is a saddle point, giving it great structural strength. Thus the team was able to thin the snow surface down to three to four inches.

Technically speaking, the surface has negative curvature at every point. The team started with a 20-ton block of specially prepared snow. After roughing it out, drilling the main holes, and then smoothing the final form, all team members gained a strong appreciation for the power of negative curvature!

The tools used were incredibly diverse, from a large ice fishing auger to various small smoothing tools. About 14 tons of snow were removed to reveal the ultimate shape.

The team was sponsored by Wolfram Research, Inc., whose Mathematica software was instrumental in gaining images of the shape. Invisible Handshake is dedicated to the memory of Al Gray, who did much pioneering work on making the generation of Costa images in Mathematica simple and fast.



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[day1_blocka.jpg](#)



[day1_helaman.jpg](#)



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